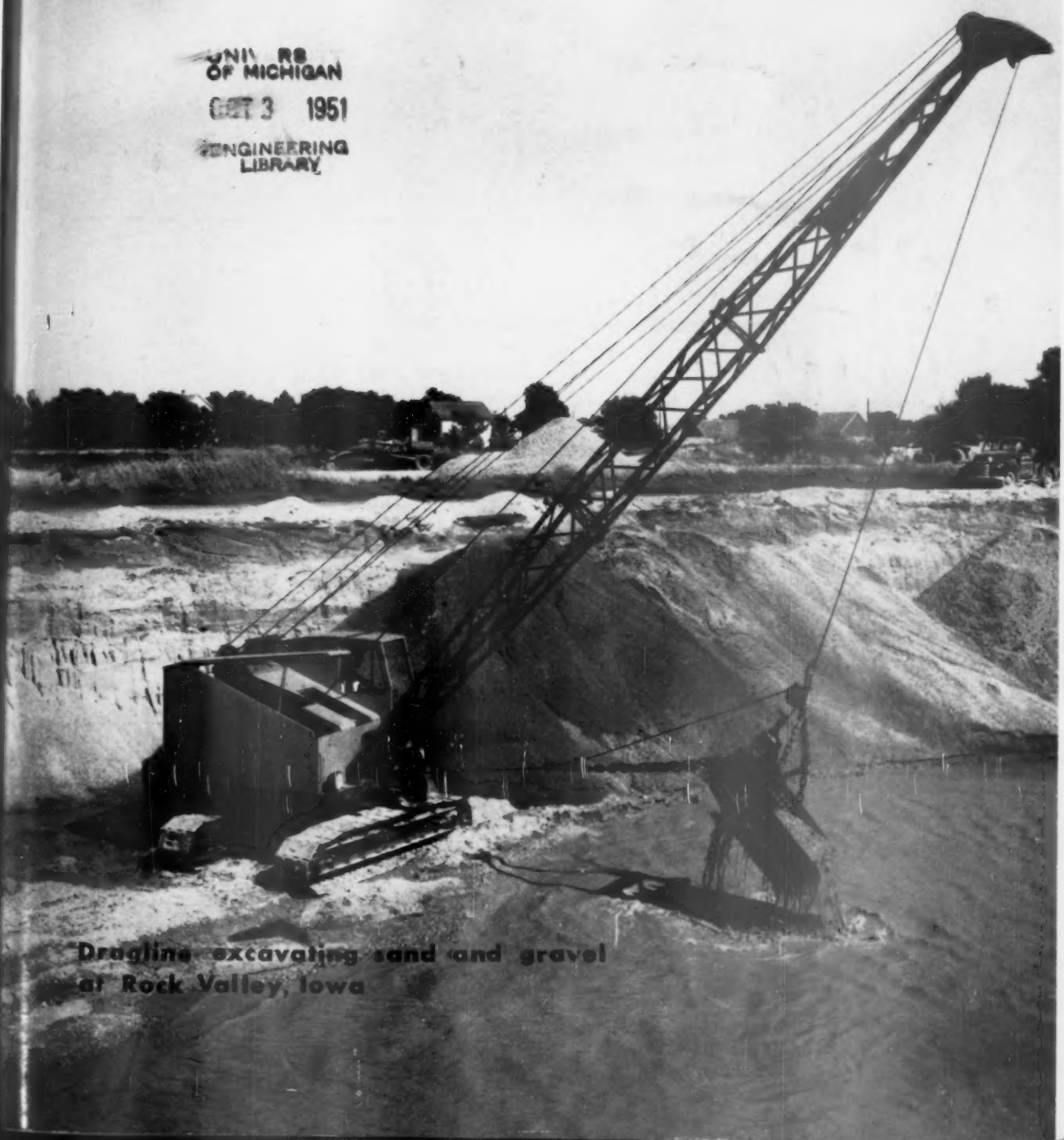
THE INDUSTRY'S RECOGNIZED AUTHORITY

ROCK PRODUCTS

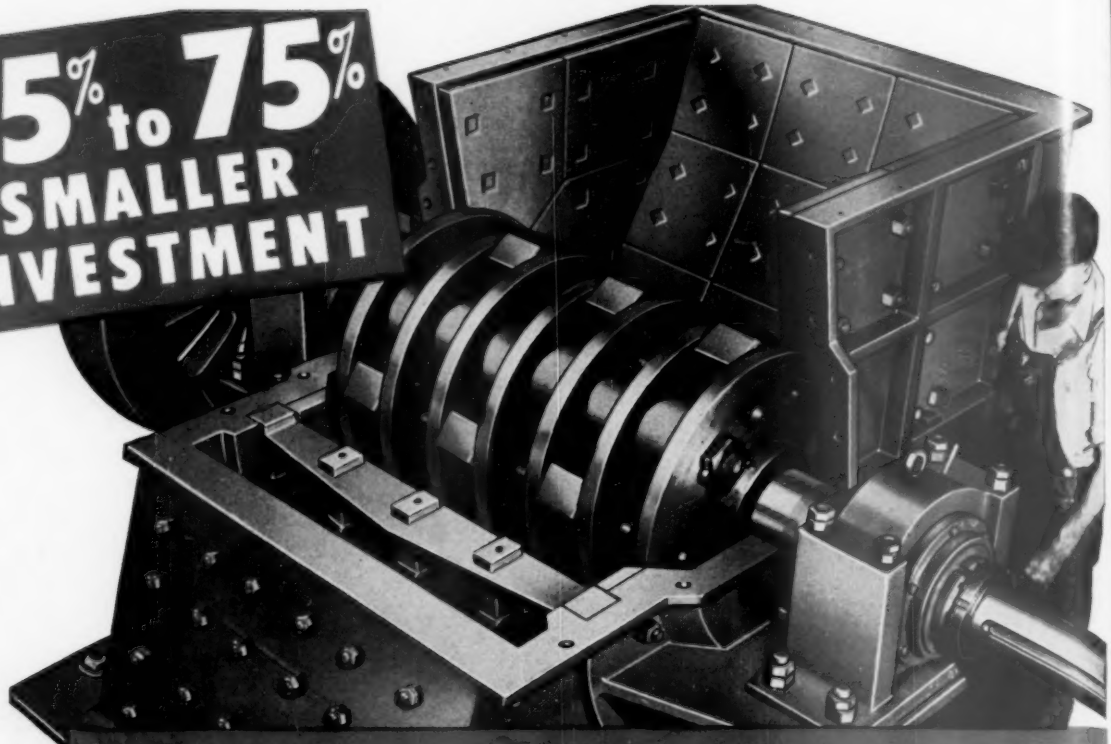
LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD

SEPTEMBER 1951



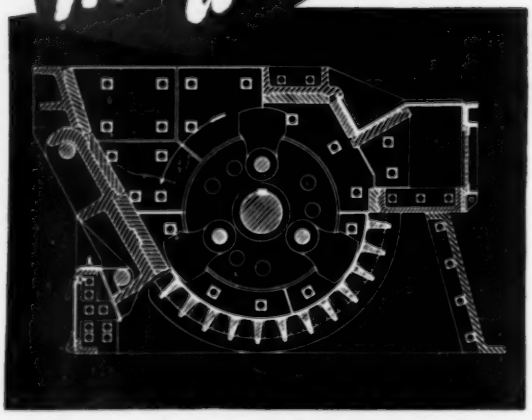
Dragline excavating sand and gravel at Rock Valley, Iowa

25% to 75% SMALLER INVESTMENT



with a Williams "Super-Slugger" Crusher

Here's why



because it reduces power shovel loaded rock to 1½ inch or ¾ inch in one operation

In one operation! That means not only a saving in machinery, less depreciation by wear and tear, but the additional savings of foundations, conveyors, drives and buildings. Because the Super-Slugger is a heavy duty hammermill that can crush power shovel loaded rock down to feed size for fine grinding or to commercial crushed stone. Built to do a giant sized job because it's heavily reinforced at all parts subject to shock and wear . . . with extra heavy manganese steel liners. Shafts of unusually large diameter. The Super-Slugger is a real payload and profit builder! For detailed information write for bulletin 634.

WILLIAMS PATENT CRUSHER & PULVERIZER CO.
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WC-49-4

Feed opening 41"x 30" to 51"x 81". Hammer blows 10,800 blows per minute in the smallest size, each blow 1,285,200 foot pounds to 17,280 blows per minute in the largest size, each blow 2,893,760 foot pounds. Size of product quickly changed by using grates with smaller openings.

WILLIAMS ALSO MAKES—

Heavy-duty hammermills in smaller sizes for all quarry operations; impact and roller mills for 200 to 325 mesh grinding; drier mills; air separators; vibrating screens; steel bins; complete "package" crushing and grinding plants.

WILLIAMS

CRUSHERS GRINDERS SHREDDERS

SEPTEMBER, 1951

ROCK PRODUCTS

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VOL. 54, No. 9

Bror Nordberg
Editor

Nathan C. Rockwood

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"WE HEAR..."

September, 1951

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Editorial Consultant

This Month

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"WE HEAR..."

September, 1951

The Maryland State Highway Department recently completed its first lime-fly ash stabilized road project. A 10 ft. wide, 200 ft. length of shoulder, located on the northern by-pass of U. S. Route 1, Laurel, Md., was stabilized with approximately 10 percent fly ash and 5 percent hydrated lime. The soil was an imported sand-gravel mixture. This test strip is to be closely observed to determine the effectiveness of lime-fly ash stabilization of road shoulders. A cost analysis is also being made.

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A total of $7.7 billion for engineering construction of all classes for the first 27 weeks of 1951 was 31 percent higher than corresponding contract awards last year, as reported by Engineering News-Record. Private construction totaled $4.3 billion, a gain of 28 percent. Public construction was up 34 percent. The high volume was said to be due largely to heavy awards for public buildings and unclassified works.

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One of the biggest gravel transport movements in the history of northern New York has recently been completed. Approximately 183,000 tons of gravel were moved through Watertown, N. Y., from pits on the Barrville road. The mass gravel transplantation forms a rehabilitation area on soft land just beyond the city limits in the Massey St. yard of the New York Central System where a $1,500,000 roundhouse for diesel locomotives will be constructed this year. A fleet of between 20 and 30 trucks was operated 14 hr. a day, 6 days a week, for about 60 days, in order to complete the moving project.

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Construction in May, 1951, in the 37 states east of the Rockies totaled $2,572,961,000, the highest total of any month in history, according to an F. W. Dodge Corp. report. The previous high was in August, 1950, when construction awards totaled $1,548,876,000. Three atomic projects, totaling $980,000,000, contributed to the all-time high, but even without them, a new high would have been set at $44,085,000 over last August, due chiefly to non-residential contracts aiding the defense drive.

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Production of brick and tile increased greatly during the first quarter of 1951, according to a recent report in the Wall Street Journal. First quarter shipments of brick were up 30 percent over the corresponding three months of 1950, while brick output was about 28 percent higher.

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Surveys have indicated that over a billion tons of iron ore exist in Venezuelan mines. Proved high-content reserves are listed in excess of 525,000,000 tons. American steel firms have invested over $42,000,000 in the mines and, within four years, these U.S.-financed mines should be producing iron ore at the rate of 11,000,000 tons annually.

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The Michigan State Highway Department is planning to construct a $10,000,000 divided limited-access highway from Detroit to Toledo, Ohio, as recently reported in Better Roads. The state highway commissioner stated that the contracts will be let next winter and construction will begin in the spring. The highway is expected to be ready for traffic by the end of 1953.

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WE HEAR

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THE EDITORS

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★ ★ Editor's Page

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A Selling Job!

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* * * * * * * * * *

An eastern engineering and construction firm has reported that its index of industrial building costs remained at 182 during the second quarter of 1951, the same as for the first quarter. A year ago it was 161. Lower prices on some products helped to offset advances in other building materials, according to the report.

* * * * * * * * * *

All major U.S. steelmaking districts will have increased capacities by 1953. The Pittsburgh-Youngstown district will be able to produce 45,000,000 tons, compared with 41,400,000 tons at the beginning of 1951 and 34,900,000 at the start of 1939. The Chicago district, which includes steel plants in Minnesota, Wisconsin, Missouri, Illinois and Indiana, will have a total capacity of 23,900,000 tons in 1953, compared with 21,500,000 tons in 1951, and 18,000,000 in 1939. The Cleveland-Detroit district will be able to produce 12,000,000 tons in 1953, compared with 9,600,000 tons at the beginning of 1951, and 7,800,000 in 1939. The western district--Colorado and the Pacific Coast states--will be able to produce 6,700,000 tons in 1953, as against 5,900,000 tons in 1951 and 2,100,000 in 1939. The eastern district will have a capacity of 24,200,000 tons in 1953, compared with 20,800,000 in 1951 and 16,100,000 in 1939. The southern district will be able to produce 6,000,000 tons in 1953, compared with 4,900,000 tons in 1951, and 2,800,000 in 1939.

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The Director of Defense Mobilization has predicted that the total physical volume of 1952 new construction will run about 80 percent of that of the 1950 level. The estimate covers all types of construction. In some categories, such as public, industrial and military, the estimate is for a volume far above that of 1950. In utilities, it is expected to be close to the 1950 volume, but in others, such as housing, construction is expected to be much lower.

* * * * * * * * * *

Equipment, including a portable gravel plant, a shovel crane and clam, a set of storage bins and two dump trucks, has been purchased by Morrow County, Ohio, commissioners. The equipment will be used to obtain gravel for use on the county roads, apparently in competition with the commercial sand and gravel industry.

* * * * * * * * * *

Production of electric power in the year ending June 30, 1951, reached a record level of over 350 billion kilowatt-hours, surpassing the previous year by over 47 billion, according to a Federal Power Commission report. Kilowatt-hours required in 1950 were up 43 percent over 1944. In 1944, the average American industrial worker used about 5 kw.-hr. for every man-hour, but last year he used nearly 7 kw.-hr. per man-hour. The average home, in 1944, used 1151 kw.-hr., compared with a consumption of 1830 kw.-hr. in 1950.

* * * * * * * * * *

At a concrete block plant, while two men were cleaning the inside of a concrete mixer, a new employe pressed the wrong button and set the blades of the mixer whirling. One man was killed and the other lost both feet.

* * * * * * * * * *

A recent report in Business Week stated that E. I. du Pont de Nemours' experimental station at Wilmington, Delaware, recently demonstrated that a kind of silica sand, called GS-199S, may be added to grease to thicken the lubricant. Greases that have been thickened with this special silica are said to retain their consistency as the temperature increases and their characteristics remain constant regardless of variations in temperatures of the bearing or moving parts that they lubricate. The additive is still in the experimental stage, but du Pont hopes that eventually it will be able to use the product commercially in a number of different lubricants.

THE EDITORS

★ ★ Editor's Page

Good Public Relations Can Accomplish Wonders for Industry

THERE ARE SO MANY conflicting opinions and ideas today that reflect in unwarranted attacks upon industry that our economic system is being threatened from many directions. Accomplishments of industry are no longer a guarantee that business as we know it will survive.

Concerns in all lines of business activity must justify their existence so that their workers, the communities in which they have plants and the public will understand their goals and accept them as contributing to the public interest.

Whether the current wave of attacks on industry and individual concerns stems from ignorance or is malicious, defense lies in the dissemination of truthful information about company operations presented so that all might understand. Large and progressive concerns continue to give more emphasis to public relations and are tackling the problem in a scientific way much as they would production or distribution. They are finding out what people are thinking and what they want to know, grievances and irritations are being analyzed, and corrective action is being taken according to a definite plan.

Smaller companies cannot afford special departments to handle public relations but they can apply basic principles which are being proved successful in dealing with human behavior.

Employe Relations

The program of Marquette Cement Manufacturing Co., told in the August issue of ROCK PRODUCTS, is outstanding for any industry and warrants careful study by even the smallest aggregates or concrete products producers. A record of thirty-five years without a strike, dating back long before a special department for public relations was established, is substantial proof that the company has a long record of having been sincere and honest in dealings with its employes. That is the foundation for any sound public relations program which, in the case of Marquette, has been broadened and organized to cope with the many special problems confronting the company and the nation today.

A public relations program like Marquette's, if a great number of concerns would follow its principles, would add up to an accumulated effort which would be extremely effective in guaranteeing the future for our economic system.

The aims and policies of the company are interpreted to employes, customers, plant communities, stockholders and the general public. Most important in the overall is that harmonious relations be created between management and its employes, which reflects substantially in improved community relations. There can be no happy relations between employes and management unless there be real sincerity and frankness on the part of management. There must be a genuine desire and effort to remove the causes of irritation and a willingness to inform employes about the company's policies, accomplishments and the distribution of earnings.

What better way can there be to stimulate good will and to offset misinformation and loose talk about excessive profits and exploitation of the employe than to present him with the facts?

Any employe hates to be kept in the dark. Many concerns which are guilty of keeping their employes on edge and at arm's length apparently never seem to recognize that the modern American employe at least wants to see evidence that his employer is willing to give out facts about the business.

A Selling Job!

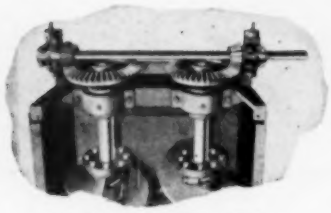
By disclosing in an understanding way details on the income and outgo interpreted in terms of the individual employe, it can generally be shown that operating expenses and taxes sap most of the earnings at the expense of the investor; otherwise the employe is receptive to unsupported information.

In a broader sense that kind of factual information should be made public so that the misinformed may be enlightened. As part of a sound public relations program, which must have as its start good employe relations, individual companies must defend their position at all cost now.

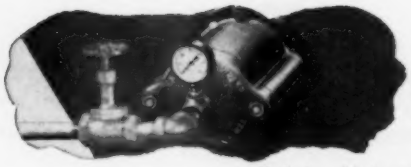
Industry has much to tell. In the rock products industries, increases in prices have been far less than for other building materials but very little has been done to put this accomplishment across. There is much to tell about taxes, the cost of pensions, insurance and other fringe benefits in their effects on prices and profits, and many other messages that would be effective if put across.

We even doubt if many companies are taking advantage of the permissible five percent deduction from earnings before taxes which can legally be taken for investment on education, scientific and welfare purposes. Under existing tax laws, the government must pay half or more of the expense. With a little imagination, the money could be spent effectively to increase good will at fifty cents on the dollar.

Bror Nordberg

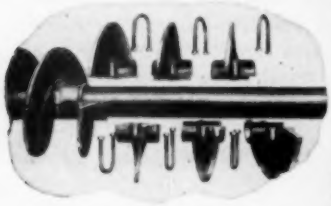


Job Engineered Gear Drives
Readily adapted to power take-off from either side of tub. Quickly adjustable gear mesh.

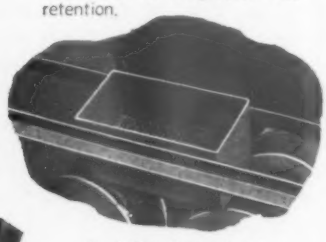


Hydrotex Marine Bearings
Pressurized water lubrication keeps abrasive materials out . . . adds years to bearing life!

Adjustable Long Weir
Gives you three times normal weir length—adjustable water volume control for greater fines retention.



Sectional Screw Flights
Easy-on, easy-off U-bolts permit flight replacement in minutes. Constant screw efficiency.



Feed Box Spots Input
Deposits material where screw flights go right to work on it—minimizes turbulence in the settling area.

Exact Classification Earns More for Eagle Owners!

Eagle's consistently faster, cleaner material classification means more than just "savings"

Rising Wash-Water Current
Multiple holes in tub bottom jet water upward into the material . . . drives foreign material out BEFORE it is conveyed up to the tub.

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IT'S EAGLE ALL THE WAY . . . at Lambert Sand & Gravel Company, LaPorte, Indiana
Lambert uses an Eagle "Swintek" Dredging Ladder, Water Scalping Tank and Eagle Screw Washer-Classifier-Dehydrator. Gets top grade sand from their pond . . . Lambert reports cleaner, more uniform easily controlled classification of Mason and concrete sand.

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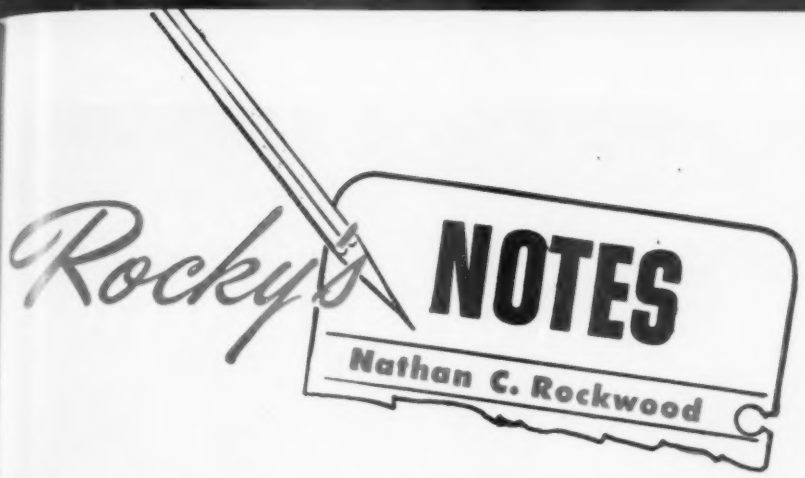

Washington Economists Explore New England

THE PRESIDENT'S COUNCIL of Economic Advisors, of which the New Deal braintruster, Leon Keyserling, is chairman, has presented a "Report to the President on New England Economy." Needless to say, it is not a description of New England "economy" as exemplified by the late President Cal Coolidge. Quite the reverse, since the report is largely an implied criticism of the very virtues that the Vermonter, Cal, so wholly believed in. It is a report of the economic mess the New England States find themselves in chiefly because of the forced application of New Deal philosophy. This fact is very guardedly admitted, or concealed altogether so far as possible.

We have always believed that the longer the professorial type of New Deal economist stayed on the job the more he would learn about actual working economics, and were he capable of absorbing new ideas, the less the country would suffer from trying out of his theories. Judging from this report the government professors of economics are learning, but are far from being ready to abandon some of their theories; or, perhaps, they have been instructed from above that political capital which can be made of their theories is more important than the theories themselves.

The New England Character

Because New England is the oldest industrialized area of the United States, there is some reason for belief that its economic fate more or less forecasts that eventually of the whole country, just as the fate of Old England provided a foretaste of what has come to New England. In both instances limited, original, natural resources have become largely exhausted. For a few generations a highly skilled people are able to process and manufacture with resources from the outside. But where their resources of skill, managerial talent and capital are also exported, the home industries no longer are able to support the elevated economic level of the whole population that they were induced or forced to accept by organized labor through socialistic inspiration.

The investigators got some insight into Yankee character, as the following quotations prove: "Its people are noted for their independence and self-reliance. They seem to look less to the Federal Government for help than do the people of any other region. * * * * In later generations the new industrial leaders often attained their positions 'by appointment'—a hand-me-down from father to son. Their wits and energies had not been sharpened by the trials and contests of the market place. Moreover, for reasons that are obscure, succeeding generations of management seemed to have turned their attention away from industrial progress and have shown too often, a greater interest in the preservation of the *status quo*. They have sought safety by minimizing their risks or by exporting capital to other regions. One consequence was to develop an attitude of protection and security rather than a continuation of the earlier drive toward industrial progress."

Thus the typical Yankee is praised and condemned for identical traits. For we do not put the interpretation on the second part of the quoted paragraph the professor does. We think it follows naturally from the first, and it stems from the Yankee's inherent belief that if he doesn't take care of his own security nobody will. He understands the difficulties of making a success of his business at home under "sociological advances," and continually greater handicaps from geographical location, transportation costs, inflation, etc. He is thinking in terms of his own money, not of "inexhaustible" funds from taxpayers.

New England Losses

The New England States have lost much of their industry, especially textiles and shoes, because, the report admits, manufacturers there pay higher wages, higher taxes, higher raw material costs, higher fuel costs, etc. The report tends to lay most of the blame for the loss on lack of management initiative and failure to modernize or build new plants. It fails to recognize that all ordinary incentive to do these things has been destroyed. The only real blame on the part of management would seem to be failure to make employes acutely aware that in their excessive demands they are preparing for their own destitution or exile. The only suggestion on this score by the Washington experts is to bring the sociological levels of other parts of the country up to those of New England; actually, of course, bring the economic levels down to that of New England.

But let us quote another paragraph: "The economy of New England, as is true of the economy of any region, depends upon human attitudes and individual initiative as well as its natural resources. New England is, of course, characterized by a wide variety of attitudes. But there is, in our opinion, one characteristic of New Englanders which stands out as being very nearly common throughout the six states. This characteristic is that of a sense of 'independence'—of self-reliance—of a propensity to combine shrewdness in economic ventures with a strong sense of pride in social and political inheritances. This is perhaps another way of saying that economic decisions in this area, whether made by management or local governments, are not made solely in terms of pecuniary gain or loss, but are influenced persistently by reference to patterns of social behavior deeply rooted in New England's heritage." In other words, New Englanders recognize that there are other things in life besides material gain!

How to Help New Englanders

The report has numerous specific recommendations. Outstanding, of course, is that New England avail itself of such Government handouts as the powers-that-be in Washington could send there. After telling how many hundred millions more the U. S. Treasury extracts from New England that it puts back in political bounties of various kinds, the experts chide New Englanders for their failure to take the necessary political steps to obtain more handouts. To quote: "One of the most perplexing problems facing New England, however, is its attitude toward federal activities. In general, influential people of New England with the important exception of many labor groups are critical of federal policies and urge retrenchment. Moreover, they do not want to be bailed out by the Federal Government."

The economic experts who wrote the report have one sound suggestion for the economic recovery of the region. It is to develop the tourist business. There, the report itself, if any one reads it, should prove helpful, because the very fact that there yet exists a section of the country, whose inhabitants still hold to such quaint ideas or ideals, should create a desire to visit it; for the same reasons one visits a zoo. Moreover, New England does have many attractions for the tourist in mountains, seashore and historic shrines.

PAYLOADERS
Pay Off ANY Place

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LABOR RELATIONS TRENDS

Employers' Illegal Activities in Fight Between Rival Unions

By NATHAN C. ROCKWOOD

NO DOUBT EMPLOYERS in the cement and other rock products industries are familiar with the continuous efforts of one or another of the various C.I.O. unions to displace the United Cement, Lime and Gypsum Workers Union, A.F. of L., which in general has gone along with employers for the good of the industry quite satisfactorily. The U.C.L. & G.W. Union being affiliated with the American Federation of Labor, which controls practically all the labor in the construction industry, is another reason why the rock products industry undoubtedly prefers to do business with it rather than with some "foreign" C.I.O. union.

Most of the C.I.O. "raiding" of cement and quarry operations, apparently, has been confined to those in coal and metal mining regions, and to operations affiliated with the steel companies, with which the C.I.O. has contracts. In the Far West, the International Union of Mine, Mill and Smelter Workers (C.I.O.) has been active for a long time. A case in point came up recently before the National Labor Relations Board, which involved an attempt of a local of this union to continue its hold on its position at the Monolith Portland Cement Co. plant, in spite of the fact that it had not complied with the filing and affidavit requirements of the Taft-Hartley Act. It had been the bargaining agent for the plant employes from 1941 to June 29, 1949.

The Cement, Lime and Gypsum Workers undoubtedly saw their opportunity without any encouragement, and petitioned for an election in May, 1949. Prior to this election the Mine, Mill and Smelter Workers attempted to distribute literature in its favor in the plant, but the company officials confiscated the circulars, and forbade any further such activity in the plant or quarry, but permitted distribution in the parking lots and at the plant entrances. Because the union had not complied with the law in the matter of affidavits, as above noted, the Cement Workers (A.F. of L.) was the only one permitted on the ballot. Nevertheless, it lost the election by failure to get a vote of the majority of the employes.

Following the election, however, the company refused any longer to recognize the Mine, Mill and Smelter Workers' Union, and is alleged to have threatened to fire employes who struck at the behest of this C.I.O. union. The union consequently appealed to the National Labor Relations Board on the ground that the company had violated the National Labor Relations Acts in throwing its weight in favor of the A.F. of L. union.

Alleged Employer Interference

The N.L.R.B. examiner found (as would be expected) in favor of the C.I.O. He contended the removal of the Mine, Mill and Smelter Workers literature was a violation of Section 8(a)(1) of the amended N.L.R.A. (the Taft-Hartley Act) on the ground that "the posting of a leaflet on the bulletin board was not 'union activity' within the meaning of the contract provision prohibiting such activity, and even if it were, there is no evidence that the posting occurred during working hours so as to be prohibited by the contract." Similarly the examiner found that a notice prohibiting distribution of similar literature was a violation of the same section of the Act.

The Board however (3 to 2) decided against their examiner as follows: "Both of these findings are based on the premise that an employer's nondiscriminatory ban on the distribution of literature in his plant is circumscribed to the same extent and in precisely the same way, as a ban on solicitation, viz., that such a prohibition, absent special circumstances, may not be imposed during nonworking time, because it is deemed to be an unreasonable impediment to self-organization. However, the Board has distinguished distribution of union literature from other forms of union activity, such as solicitation, in this connection. We have held that an employer can lawfully prevent the distribution of literature in the plant proper, even during employes' *nonworking* time, in the interest of keeping the plant clean and orderly, at least where it is not evident that such activity cannot readily be conducted somewhere off the employer's premises. Accordingly, and especially in view of the fact that the employes were permitted to distribute literature in the company parking lots and the entrances to the plant, we find the respondent company's interdiction against any distribution of literature in the plant, and the steps it took to enforce that interdiction, were permissible limitations upon its employes' organizational activities, and not violative of Section 8(a)(1)."

Employer Exceeds Rights

The employer company, on the other hand, was deemed to have exceeded its rights to recognize only the Cement, Lime and Gypsum Workers' union, when it threatened to fire any employe who went on strike to compel recognition of the Mine, Mill and Smelter Workers' union, which it had ceased to recognize. This notice was given employes, July 5, following company recognition of the A.F. of L. union, which under the circumstances was able to show a majority of the employes two weeks later. Accordingly, the Board held: "We find unanimously that the respondent company, by this entire course of conduct, including its recognition of the A.F. of L., has assisted, and contributed support to the A.F. of L. in violation of Section (8)(a)(2)."

The company also made a mistake which it acknowledged with a correction six months later, of circulating to employes copies of its new contract with the A.F. of L. union, which contained a clause giving seniority rights only to A.F. of L. members. On this point the Board ruled as follows: "The Board has held that the execution by an employer of an illegal discriminatory contract is a violation of Section (8)(a)(1) and (2) because such a contract coerces employes to become or remain members of the contracting union, and correspondingly restrains employes from exercising their rights to refrain from becoming or remaining members of the contracting union. Such a contract was executed here. It is true that [in this instance] the parties did not intend to enforce it so as to discriminate against nonmembers of the A.F. of L., but the employes were led to believe otherwise. By publicizing the contract in its discriminatory form, the respondent company led the employes to believe that their seniority rights under the contract depended upon A.F. of L. membership.

"The necessary effect of the publication, therefore, was to coerce the employes to become or remain members of A.F. of L. by an apparent threat to discriminate against nonmembers, no less than if the parties had intended to execute and enforce the publicized contract. And although the respondent company may not have intended to publicize a discriminatory contract any more than it intended to execute or enforce one, it must be held responsible for this unlawful effect in view of the fact that its publication of the contract was purely negligent. It is also true that the parties to the contract corrected it about a month after its publication so as to make it non-discriminatory, but they did nothing for six months thereafter to remove the coercive effect of the publicized contract. Indeed by delaying notice to the employes of the correction of the contract during this period, the respondent company inexcusably permitted the unlawful effect of the publicized contract to continue, for which it must clearly be held responsible."

However, the Board held that the respondent company did not violate Section (8)(a)(3): "Because the

(Continued on page 106)

the *Personal Side* of the news

On Leave of Absence

HENRY A. HUSCHKE, managing director of the Agricultural Limestone Institute, Washington, D. C., has taken an indefinite leave of absence to accept the position of Head of the

Henry A. Huschke

Agricultural Chemicals Section of the Office of Price Stabilization. It will be remembered that, prior to joining the institute in 1945, Mr. Huschke was with the Agricultural Chemicals Section of the OPA during World War II. One of his first duties with OPS will be to work on a pricing regulation to fit the needs of the agricultural liming materials industry. During Mr. Huschke's absence, the activities of the institute with which he was concerned will be curtailed. However, the Washington office of A.L.I. will be maintained pending final disposition of the merger of the Agricultural Limestone Institute and the National Agricultural Limestone Association.

Elected President

FLOYD REDICK, manager of the bituminous products division of Marble Cliff Quarries Co., Columbus, Ohio, was recently elected president of the Franklin County Chapter of the Society of Professional Engineers.

Gypsum Plant Promotions

JOHN J. BUTLER, plant manager at the Gibsonburg, Ohio, plant of National Gypsum Co., Buffalo, N. Y., has announced the following promotions and changes in the plant supervisory organization: Norman Smith has been promoted to maintenance superintendent. He has been employed at the plant continuously since 1918 and has advanced steadily through various jobs concerned with plant maintenance. Wayne Krotzer has been made night foreman after working on kiln operations, hydrating and milling jobs at the plant since 1922. Sidney Ottney, who has been with the plant since 1926, has been promoted to stone drying foreman. John Fehlhaber continues as quarry superintendent, and Art Swartz as kiln foreman. R. H. Schuett has been appointed sales order supervisor. James Price has been transferred from the Kimballton, Va., plant and will act as plant office manager. William Snyder has been transferred from the Luckey, Ohio, plant as plant engineer and safety and personnel supervisor.

Re-elected President

C. K. BOETTCHER was re-elected president of Ideal Cement Co., Denver, Colo., at the recent meeting of the board of directors. Cris Dobbins was re-elected executive vice-president and general manager; M. O. Matthews, vice-president and general manager, Southern division; G. W. Ballantyne, secretary and treasurer; J. W. Hand, assistant secretary and assistant treasurer; and O. F. Counts, comptroller.

Safety Consultant

A. J. R. CURTIS, who has been in charge of the Accident Prevention Bureau of the Portland Cement Association, Chicago, Ill., for the past 25 years, has been named assistant secretary and safety consultant. Ivan F. LeGore, who since 1944 has served as assistant manager of the Accident Prevention Bureau, has been appointed manager of the Bureau. Mr. Curtis has been with the association since 1916. He received his A.B. and M.E. degrees from Lewis Institute. Prior to joining the association he had served

Ivan F. LeGore

A. J. R. Curtis

for seven years as laboratory technician and assistant engineer with Universal Portland Cement Co. He was director of extension for P.C.A. from 1916 to 1920, and manager of the Cement Products Bureau from 1920 to 1926, when he was appointed assistant to the general manager of the association. Mr. Curtis is well known for his work in industrial hygiene and safety. He was secretary of the Cement Section of the National Safety Council for 16 years, and for many years was a member of the executive committee and of the board of directors. He has served as a member of the President's Conference on Industrial Safety. He is a charter member of the Industrial Hygiene Foundation, a member of the American Industrial Hygiene Association, and a past president of the American Society of Agricultural Engineers. He has served as a trustee of Illinois Institute of Technology and the Armour Research Foundation since 1940.

Mr. LeGore joined the association in 1936 as a member of the staff of the Accident Prevention Bureau, and has since served in that bureau with the exception of two years during World War II when he headed the protection program of the Airplane Division of Curtiss-Wright Corp., Buffalo, N. Y. Prior to joining the association, Mr. LeGore was associated with the Safety and Health Division of Western Electric Co., Hawthorne Works, Chicago, Ill. A graduate of Grinnell College, Mr. LeGore is a member of the American Society of Safety Engineers; a member of the executive committee, and program chairman of the Cement and Quarry Section of the National Safety Council; and a representative on the Council's Industrial Conference. He has taught courses in industrial safety engineering at Illinois Institute of Technology.

N.R.M.C.A. President

NORMAN J. FREDERICKS, president of the National Ready Mixed Concrete Association, comes from a family long associated with the building materials industry in Detroit. He is secretary-treasurer of the Koenig Coal and Supply Co., Detroit, Mich., headed by his father, which last year celebrated its 80th anniversary. After graduating from the University of Notre Dame with an A.B. degree, Mr. Fredericks studied law at the University

Norman J. Fredericks

of Michigan, where he won the honor degree of Juris Doctor. During the summer months he worked at the yards and at the gravel plant, selling, dispatching, expediting deliveries, etc., and finally as manager of the yards. After graduation from law school, he practiced law for several years in Detroit, specializing in corporation, taxation and business law, and then returned to the company on a full-time basis. In 1942, he was elected secretary-treasurer. Mr. Fredericks is very active in civic affairs. Among his outside interests are athletics. He has played practically all of them but specialized in handball more than anything else. While in college he was singles handball champion of Notre Dame and Michigan and has been champion for many years at the Detroit Athletic Club. He also played on the Notre Dame tennis team for two years and won his letter in that sport. Mr. Fredericks, in addition to serving on the board of directors and as an officer of the National Ready Mixed Concrete Association, has served several terms as a member of the board of directors of the Detroit Coal Bureau and also one term as a director of the Detroit Fuel Oil Dealers Association.

Eschenbrenner Awards

H. X. ESCHENBRENNER, president of the Universal Concrete Pipe Co., Columbus, Ohio, recently presented $500 checks and engraved medallions to David L. Crowson, a senior in the engineering school at the University of Florida, and Frank M. Masters, Jr., a senior at Lehigh University, who were winners of the first annual Eschenbrenner Awards. Honorable mention awards of $100 each were presented to G. Robert Koch, Lafayette College; Robert C. Deen, University of Kentucky; and B. A. Keiger, North Carolina State College. Mr. Crowson's paper dealt with "Comparative Effects of Hydrogen Sulfide on Air Entrained and Plain Concrete." Mr. Masters' award was based on his investigation of the effects of capping materials on the apparent strength of concrete test specimens.

Re-elected President

M. MOSS ALEXANDER was re-elected president of Missouri Portland Cement Co., St. Louis, Mo., at the annual meeting of the board of directors. E. W. Henne was re-elected vice-president and treasurer; and John H. McNatt, vice-president and secretary. Directors elected were M. Moss Alexander, D. K. Catlin, Frank B. Coleman and James G. Forsyth.

Receive Thompson Award

R. C. MIELENZ, L. P. WITTE AND O. J. GLANTZ, U. S. Bureau of Reclamation, Washington D. C., received the Sanford E. Thompson Award at the recent meeting of the American Society for Testing Materials, for their paper entitled "Effect of Calcination on Natural Pozzolans" presented at the Pacific Area National Meeting in October, 1949. This award is given for a paper of outstanding merit on concrete and concrete aggregates.

Plant Managers

HENRY B. BURKS has been appointed plant manager of the new Bunnell, Fla., plant of Lehigh Portland Cement Co., Allentown, Penn., which is now

Henry B. Burks

Philip E. Carlson

under construction. He was formerly plant manager at Birmingham, Ala., and will be succeeded in this position by Philip E. Carlson, who was plant engineer and supervising chemist at the Buffalo, N. Y., plant. Mr. Burks was graduated from Georgia School of Technology and received his M.S. degree in chemical engineering from Columbia University. He has been plant manager at Birmingham since 1949, when he succeeded R. H. MacFetridge, who retired. Employed there as plant engineer in 1937, he became assistant plant manager and supervising chemist in 1946. He is a veteran of World War II, having served from 1941 to 1946 in the Coast Artillery Corps with service in the Philippines.

Mr. Carlson joined Lehigh in 1946. After completing the operating department's course of training, he was assigned to the Buffalo plant, and was promoted to plant engineer and supervising chemist in 1948. He was engaged in chemical engineering work in Minneapolis after his graduation from the University of Minnesota, then served in the U. S. Navy from 1941 to 1945. As an engineer officer and diesel specialist, he had charge of machinery repairs on submarines at the Philadelphia navy yard.

Service Certificate

LLOYD H. YEAGER, general manager of the Gypsum Association, Chicago, Ill., has received a Certificate of Service from the American Standards Association, New York, N. Y., in recognition of his work in the development of American Standards.

Kelley Island Promotions

FRANCIS J. COLLINS, general sales manager of The Kelley Island Lime and Transport Co., Cleveland, Ohio, has been elected vice-president of the company, and Dr. Jacob O. Kamm, a director since 1947, has been elected a member of the executive committee.

Short Course on Concrete

GEORGE W. VAUGHT, Columbus, Ohio, structural engineer for the Portland Cement Association, recently conducted a short course on prestressed concrete for engineers and architects of Columbus and central Ohio. The course, which was jointly conducted by the Engineering Experiment Station of Ohio State University and the Portland Cement Association, included the principles of design and the physical testing of a prestressed concrete beam.

Heads New Association

HARRY A. BARNEY, vice-president and general manager of Barney & Dickenson, Inc., Vestal, N. Y., has been elected president of the newly organized Empire State Sand, Gravel and Ready-Mix Association, which replaces the old Empire State Sand and Gravel Producers Association which went out of existence about 15 years ago. Other officers are Leon Wendell, Lockport, vice-president; W. W. Nass, Syracuse, secretary; and John Hopkins, Albany, treasurer.

Safety Speakers

ARTHUR HARRISON, assistant to the president of Millwood Sand Co., Zanesville, Ohio, was one of the speakers at the Cement, Lime, Quarry, Sand and Gravel Section of the 21st All-Ohio Safety Congress and Exhibit held recently in Columbus. A. C. Sherrill, personnel director of the Columbia Chemical division of Pittsburgh Plate Glass Co., Barberton, is chairman of the section, and Claude L. Clark, secretary of the Ohio Sand and Gravel Association, Columbus, is secretary.

OBITUARIES

BERTRAND H. WAIT, president of Wait Associates, Inc., consulting engineers, New York, N. Y., died July 20 at his home in New Rochelle. Mr. Wait, who founded the firm in 1935, had previously been a district engineer for the New York State Department of Public Works and Eastern manager for the Portland Cement Association. Born in Hallock Township, Ill., he graduated in 1902 from Cornell University. He had lived in New Rochelle since 1919. Mr. Wait was a member of the American Concrete Institute, American Road Builders' Association and the American Society of Civil Engineers.

WILLIAM SHOULDERS, founder of the W. H. Shoulders Concrete Co., Dallas, Texas, passed away on July 8. He was 40 years of age. Born and educated in Dallas, where he lived most of his life, Mr. Shoulders served three years in the Navy as a chief carpenter's mate. After the war, he returned to Dallas, where he started the concrete business that he managed until his death.

WILLIAM C. JOHNSON, executive vice-president of Allis-Chalmers Manufacturing Co., Milwaukee, Wis., died suddenly on Thursday, July 26. He was 49 years old. He was also a member of the board of directors and the executive committee, and chairman of

William C. Johnson

the board of Canadian Allis-Chalmers Ltd. Mr. Johnson joined the company in 1924 as a machinist helper. During the next five years he worked with the field service and erection department. Later he was assigned to work on installing, servicing and testing of mining and cement machinery. In 1929 he was named representative of the crushing and cement division in the Atlanta, Ga., district. Six years later he became general sales representative at Chattanooga, Tenn. In 1937, Mr. Johnson opened the district sales office in Knoxville, Tenn., where he handled contracts with the aluminum and phosphate industries and the Tennessee Valley Authority. Three years later, he returned to Milwaukee and was named sales manager of the crushing and cement department. In 1942 he was made general sales manager of general machinery products, replacing the late Walter Geist, who had been elected president.

In 1944, Mr. Johnson was made vice-president of the general machinery division where he served until his appointment as executive vice-president in charge of that division. He was elected a member of the board of directors in 1948, and in March of the same year was appointed a member of the executive committee. Following the death of Walter Geist, Mr. Johnson was appointed executive vice-president in charge of both general machinery and tractor divisions.

MANLEY E. JOHNSON, who was engaged in the lime kiln and stone business in northern New York for many years, died July 3 at Gouverneur, N. Y. He was 93 years old.

W. H. WALLACE, president of the Wallace Stone Co., Bay Port, Mich., died July 15. He was a veteran of World War I and active in many civic enterprises in his home town of Bay City. He was a director for many years of the National Crushed Stone Association, and always active in its councils.

PROF. FRANK ERWIN RICHART, who had been in charge of concrete research at the University of Illinois, Urbana, Ill., since 1926, died July 16 at the age of 59. He had been on leave of absence since February, 1950, because of ill health. Internationally known for his studies of the design and use of reinforced concrete, Prof. Richart was awarded the Leonard C. Wason medal of the American Concrete Institute in 1938 and the Lindau medal of the Reinforced Concrete Institute in 1949. A few weeks before his death he was made an honorary member of the American Society for Testing Materials. Born in Lena, Ill., he received his B.S. degree in civil engineering from the University of Illinois in 1914, his M.S. degree in 1915, and the professional degree of civil engineering in 1922. Prof. Richart was president of the American Concrete Institute in 1939, and served on the board of directors from 1934 to 1945. He was vice-president of the American Society for Testing Materials and served on the executive committee from 1936 to 1938, and on the board of directors from 1946 to 1949. He was also an active member of the Western Society of Engineers, which he represented on the Highway Research Board, the American Society of Civil Engineers, and the Society for Experimental Stress Analysis.

Prof. Frank Erwin Richart

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INDUSTRY *News*

Shown above is Marquette Cement Mfg. Co.'s new plant at Brandon, Miss. All concrete structures have been completed and erection of steel frameworks is about to get underway. Plant capacity will be 1,000,000 bbl. of cement annually

Potash Production

POTASH SALES and output reached new highs last year, with stocks, as of January 1, 1951, also higher than in recent years, according to Bureau of Mines figures. Domestic output of potassium salts in 1950 totaled 2,241,044 short tons with potash content at 1,286,762 tons. Sales totaled 2,220,803 tons, or 1,275,494 tons of potash, valued at $39,695,038.

New Cement Plant for South Carolina?

AMERICAN CEMENT CORP., Florence, S. C., recently announced plans to build a $6,825,000 cement plant between Harleyville and Holy Hill, S. C. Plant capacity would be 3000 bbl. of cement per day, or approximately 1,000,000 bbl. per year. National Production Authority has given its approval for a certificate of necessity for the plant and approval for a 70 percent tax amortization over a 5-year period.

The new plant is expected to be in operation by mid-summer of 1952 and approximately 300 persons will be employed. Officers of the company are David L. Anderson, president; Eugene E. Stone, vice-president; C. R. Smith, vice-president; and W. R. Dawson, secretary-treasurer.

Domestic Mica

M. A. CHAPMAN, president of Mica Insulator Co., Schenectady, N. Y., has predicted that a French process to produce electrical insulation from domestic scrap, which has heretofore been unusable, may end dependence on foreign sources of mica. Mr. Chapman also announced the formation of a new company, Samica Corp., which will use patents based on the work of the late Jacques Bardet, in France in 1939. Most sheet mica used in the United States today is imported from India and Madagascar and is processed by hand labor. According to Mr. Chapman, hand labor will be almost entirely eliminated in the new process. Chemical and heat treatment will be used to reduce the raw mica to a pulp which is then formed into continuous, thin sheets by an adaptation of paper-making techniques.

Car Supply

THE NATIONAL INDUSTRIAL SAND ASSOCIATION has estimated that the car supply requirements for the industrial sand industry for the third quarter of 1951 will be approximately 37 percent greater than for the corresponding quarter of 1950. Railroad car shipments for industrial sand during the second quarter of 1951 totaled 57,523 cars, an increase of 12,495 cars, or 28 percent over total car shipments in the second quarter of 1950.

The association was advised by 47 member companies, 40 of whom had truck shipments from their plants, that truck movement of industrial sand from their plants in the second quarter of 1951 totaled 297,237 tons.

Freight Rate Increases

ON JANUARY 16, 1951, the railroads petitioned the Interstate Commerce Commission for an increase in freight rates, due to increased costs of materials, supplies and wages. A temporary increase of 4 percent in some areas and 2 percent in others was granted. The railroads then revised their original petition by asking for a 15 percent increase. The I.C.C., after completing hearings on the amended petition, allowed an increase of 9 percent within the Eastern Territory, which includes the area east of the Mississippi and north of the Ohio and Potomac rivers. An increase of 6 percent was allowed for movements within all other territories. Rates for all inter-territorial shipments were increased by 6 percent. The same increases are also applicable to switching charges.

These percentage increases include the temporary increases granted last March. The effective date of the increase is 15 days after publication of the tariffs and notification to the public, but not later than October 1, 1951. The increases will expire February 28, 1953, unless they are modified or terminated prior to that date.

Gypsum Plant

KAISER GYPSUM, division of Kaiser Industries, Inc., Oakland, Calif., recently announced plans to build a gypsum products plant at Seattle, Wash., the first of its kind in the northwest area of Washington, Oregon and Idaho. The plant would serve civilian and defense construction in the Northwest, as well as Alaska, Hawaii and other Pacific bases.

A firm of consultants employed by the company has recommended that, to serve the area most efficiently, Kaiser Gypsum construct a three-kettle calcining plant and a gypsum board plant capable of producing 100,000,000 sq. ft. of board per year. Estimated cost of the proposed plant is approximately $2,500,000, and would afford employment for about 150 persons, with an annual payroll of about $500,000. The plant will produce a full line of gypsum products—lath, wallboard, sheathing, plaster, agricultural gypsum and cement retarder.

Kaiser Gypsum also operates gypsum plants at Long Beach and Redwood City, Calif. Raw gypsum is obtained from deposits on San Marcos Island, southern California and Mexico. The company operates its own bulk ore vessel, a 10,000-ton Liberty ship equipped to handle bulk material.

Florida Cement Expansion

GENERAL PORTLAND CEMENT CO.'S Florida Portland Cement Division, Tampa, Fla., has started on an expansion program designed to increase

plant output by 1,300,000 bbl. per year. All building and installations of new equipment are expected to be completed by early in 1952. The National Production Authority has granted a certificate of necessity for the expansion. The Tampa plant is Florida's only cement mill.

Agricultural Appropriations

THE SENATE, after two days of debate on the Agricultural Conservation Program, voted on July 26, 41 to 39, to authorize funds for the A.C.P. amounting to $280,000,000 for 1952. The bill now goes to the House which had previously approved $225,000,000 for the 1952 program. The 1951 program which was cut back to $256,500,000 by the House was also raised to $280,000,000 by the Senate after several attempts to lower the figure.

Portland Cement Production

THE PORTLAND CEMENT INDUSTRY produced 21,984,000 bbl. of finished cement in June, 1951, as reported to the Bureau of Mines. This was an increase of 10 percent compared with the output in June, 1950. Mill shipments totaled 24,935,000 bbl., an increase of 1 percent over the June, 1950, figure, while stocks were 7 percent above the total for the same month in 1950. Clinker production during June, 1951, amounted to 21,327,000 bbl., an increase of 10 percent compared with the corresponding month of the previous year. The output of finished cement during June, 1951, came from 153 plants, located in 36 states and Puerto Rico. During the same month of the previous year, 20,001,000 bbl. were produced in 150 plants.

Canada Cement Expands

CANADA CEMENT CO., LTD., Montreal, Canada, has announced plans for the installation of an additional kiln at its Belleville, Ont., plant, which will increase plant capacity from 2,600,000 bbl. to 3,800,000 bbl. of cement annually. The new unit is expected to be in operation by May 1, 1952.

Including this new project, Canada Cement Co. now has under way an expansion program which will result in an increase of production of 3,200,000 bbl. annually, from 14,000,000 to 17,200,000 bbl. The additional expansion projects are at Havelock, N. B., and Exshaw, Alberta. The new plant at Havelock is nearly completed and will be in full operation this month with an annual production of 800,000 bbl.

Coming Conventions

September 10-12, 1951—
National Lime Association, Operating Meeting, Heaton Hall, Stockbridge, Mass.

October 1-3, 1951—
National Sand and Gravel Association, Board of Directors Meeting, The Greenbrier, White Sulphur Springs, W. Va.

National Ready Mixed Concrete Association, Board of Directors Meeting, The Greenbrier, White Sulphur Springs, W. Va.

October 8-12, 1951—
National Safety Congress and Exposition, The Stevens, Palmer House, Congress, Morrison and La Salle Hotels, Chicago, Ill.

October 17-19, 1951—
National Industrial Sand Association, Semi-Annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

October 22-24, 1951—
American Society for Testing Materials, Committee C-1 on Cement and Committee C-9 on Concrete and Concrete Aggregates, Joint Meeting, Purdue University, Lafayette, Ind.

October 30-31, 1951—
American Concrete Institute, Regional Meeting, Sheraton Hotel, St. Louis, Mo.

November 4-7, 1951—
National Concrete Masonry Association, Southern Regional Meeting, Roosevelt Hotel, New Orleans, La.

November 14-15, 1951—
National Slag Association, Annual Meeting, Knickerbocker Hotel, Chicago, Ill.

November 26-27, 1951—
National Association of Silo Manufacturers, Annual Convention, Palmer House, Chicago, Ill.

November 26- December 1, 1951—
Chemical Industries Exposition, 23rd Exposition, Grand Central Palace, New York, N. Y.

January 15-17, 1952—
National Agricultural Limestone Association, 7th Annual Convention, Hotel Statler, Washington, D. C.

January 16-17, 1952—
Wisconsin Concrete Products Association, 32nd Annual Convention, Plankinton House, Milwaukee, Wis.

February 11-15, 1952—
National Sand and Gravel Association, 36th Annual Convention and Exhibit, The Stevens, Chicago, Ill.

National Ready Mixed Concrete Association, 22nd Annual Convention and Exhibit, The Stevens, Chicago, Ill.

Week of February 17, 1952—
National Crushed Stone Association, The Stevens, Chicago, Ill.

Agricultural Limestone Institute, The Stevens, Chicago, Ill.

Great Lakes Shipments

GREAT LAKES VESSELS moved 23,395,011 net tons of limestone, 78,205,592 gross tons of iron ore and 57,640,222 net tons of coal in 1950, according to figures recently released by Lake Carriers Association. The shipment of iron ore was the second largest peacetime total; coal shipments were the fourth largest in history; and the limestone shipments set a new all-time record. The grand total of shipments was exceeded only by 1948 and two wartime years.

Masonry Cement

LONGVIEW LIME CORP., Birmingham, Ala., has announced the completion of its new Longview No. 2, Ala., plant, for the production of masonry cement. The formula for the masonry cement was perfected by the Southern Research Institute of Birmingham. It will be a composition of lime, portland cement, water-cooled and granulated slag and other additives. Warren Lewis, president, stated that the mortar mix will be of a desirable light color, very plastic and will well exceed all specifications of the American Society for Testing Materials and the U. S. Bureau of Standards. The mix needs to be added only to water and sand applied.

Plant Maintenance Show

THE 3RD ANNUAL PLANT MAINTENANCE SHOW will be held at Convention Hall, Philadelphia, Penn., January 14-17, 1952, as announced by Clapp & Poliak, Inc., New York, N. Y., the exposition management.

The displays are expected to cover an area almost four times that of the first show, held in 1950. More than 200 companies are expected to participate. The Plant Maintenance Conference is to be held concurrently with the show. Advance registration cards and hotel information may be obtained from Clapp & Poliak, Inc., 341 Madison Ave., New York, N. Y.

"WHEN YOU GETTING YOUR NEW GLASSES, JIMSON?—YOU'RE READING THAT CRACK IN THE WALL AGAIN!"

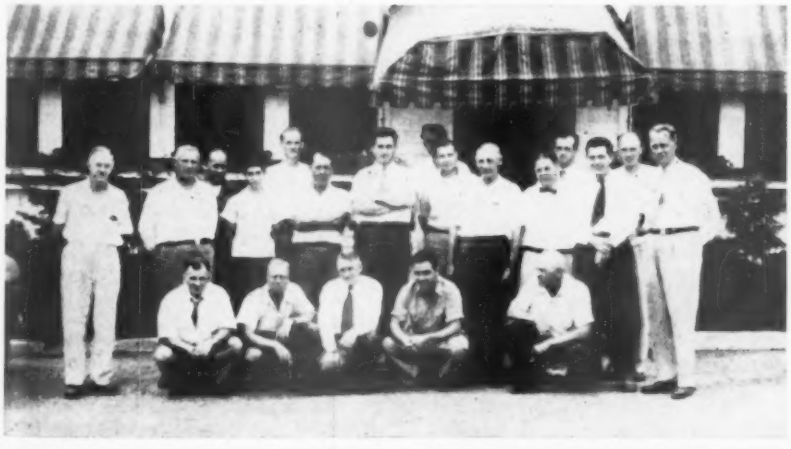
New Office Space

NATIONAL GYPSUM CO. has announced plans for building a $552,230 addition to its office building in Buffalo, N. Y. The addition, in the rear of the present structure, will be equipped with a bomb shelter. The company has received permission from the National Production Authority to proceed with the expansion.

The project will be a 3-story unit, containing 24,000 sq. ft. of office space and will measure 78 x 111 ft. The expansion will increase the company's overall office space by about 75 percent. Construction is expected to be completed by the middle of 1952.

Highway Congress

THE FIFTH PAN AMERICAN HIGHWAY CONGRESS will be held October 8-14, 1951, at Lima, Peru, S.A. This congress will have the character of a specialized conference and is intended to coordinate the efforts of the nations of the Americas to encourage development and improvement of road building, maintenance, improvement and exploitation.



Eastern New York Mineral Aggregates Safety Council has been sponsoring plant trips to members' plants for the purpose of learning of safety practices in use (see ROCK PRODUCTS, May, p. 80). The group is shown here after a recent visit to the Haverstraw plant of New York Trap Rock Corp.

Completes 25th Year

THE FRANCE STONE CO. Laboratories, Perrysburg, Ohio, on August 1, 1951, completed a quarter of a century of service in the production, development and use of mineral aggregates and related materials.

1951 Highway Roster

THE AMERICAN ROAD BUILDERS' ASSOCIATION has announced that the 1951 Roster of State Highway Officials and Engineers, an annual production of the association, is now ready for distribution. The 66-page, pocket-size booklet contains the names, titles and addresses of highway department personnel of all states and the U. S. Bureau of Public Roads. It is published each year in collaboration with the state highway departments. Copies may be obtained from American Road Builders' Association, International Building, Washington 4, D. C. Price per copy is $1, postpaid.

N.P.A. Construction Order

NATIONAL PRODUCTION AUTHORITY ORDER M-4 on construction was revoked on August 3, 1951, and is superseded by NPA Order M-4A, which became effective August 3, 1951. This order prohibits commencement of construction of all types of buildings, structures or projects which require the use of more than specified quantities of controlled materials unless the prime contractor has received an authorized construction schedule and an allotment of materials under CMP-Reg. 6. For construction requiring less than the specified amounts, the contractor can self-authorize his orders for the needed materials.

The "List A" of prohibited construction of M-4 is transferred intact to M-4A. The order prohibits the use of more than two tons of carbon steel, 200 lb. of copper, or any quantity of aluminum, alloy steel or stainless steel for construction listed in Table 1. If more than these small amounts are required, specific authorization is required.

For construction projects other than those listed in Table 1, or for multi-unit structures, prior to October 1, construction may be commenced provided the materials used do not exceed the amounts allowed for self-authorization in Schedule 1 of Direction 1 to CMP-Reg. 6.

Pavement Yardage

AWARDS OF CONCRETE PAVEMENT for the month of July and for the first seven months of 1951 have been announced by the Portland Cement Association as follows:

	Square Yards Awarded During July 1951	During 1st 7 Months 1951
Roads	2,840,478	16,989,630
Streets and alleys	2,072,636	14,599,667
Airports	4,334,836	11,531,278
Totals	9,247,950	43,120,575

HINTS and HELPS

PROFIT-MAKING IDEAS DEVELOPED BY OPERATING MEN

Large Diameter Valves

WHERE LARGE (or small) volumes of pulp are to be handled, the lubricated plug valve has many advantages, especially if the valve is used intermittently. Some valves, when kept in the closed position, are apt to rust or "freeze" shut, and opening them requires excessive strains which can ruin the valve. With the lubricated type valve this hazard has been almost completely eliminated.

Fig. 1: Thickener underflow suction line showing plug lubricated cut-off valve

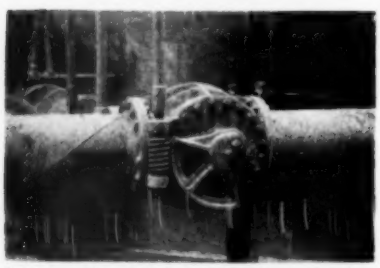


Fig. 2: Plug lubricated cut-off valve has pinion and quadrant gear

The three valves shown in the illustrations are all between 12 to 15 in. in diameter. Fig. 1 is the older and simpler type and was in use on the underflow suction line of a large Dorr thickener installation. Valve in Fig. 2 has a pinion and quadrant gear so the lubricated plug cut-off valve can be opened and closed from a remote

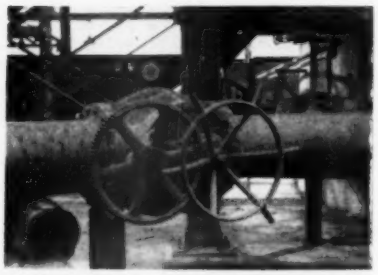


Fig. 3: Valve uses pinion and gear along with hand-wheel to open or close cut-off valve

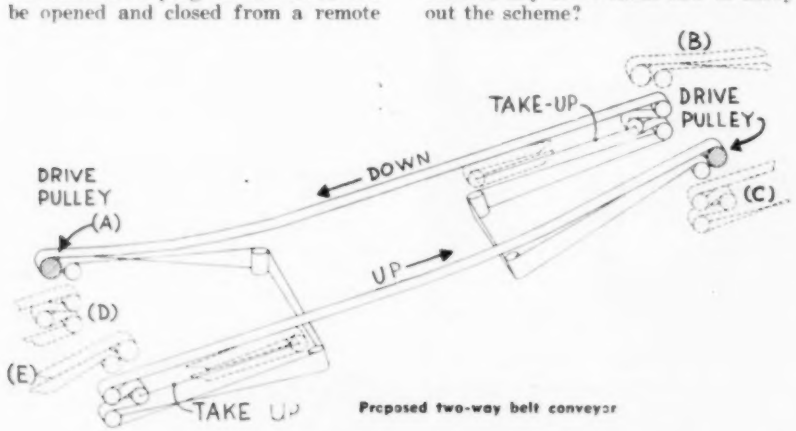
station. Valve in Fig. 3 uses a pinion and gear along with a hand wheel to open or close the cut-off valve.

All the valves shown were manufactured by American Car and Foundry Co. All the pictures were taken in the Florida phosphate fields.

Two-Way Belt Conveyors

RECENTLY, A BELT conveyor installation was planned for operation in the middle-east (Ohio) that would be over 100 miles long. The problems involved in such an installation are still being debated. The basic idea is to carry commodities both ways, thus using the return side of the belt to carry its share of pay-load. Possibly in some rock products plants in the United States this is now being done but the nearest approach to it that has come to our observation was to carry two sizes of crushed stone on the same belt. This was done by piling one size on one side of the belt, and the second size parallel to it. At the unloading point, a splitter diverted each stream to its proper bin. The belt was overly wide for the tonnage handled but the idea fit the operating conditions admirably.

One suggested method of a two-way belt conveyor is shown below. B,C,D,E are variations of the head and/or tail pulley assemblies. Have any of our readers any other ideas how to carry out the scheme?

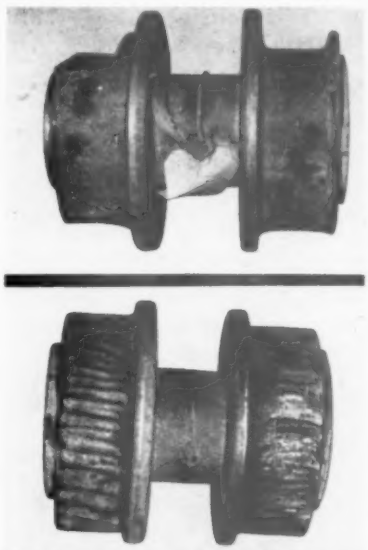


Proposed two-way belt conveyor

Rebuilding Top Carrier Rolls

DURING THE PAST YEAR there has been an increased acceptance of the automatic electric welding method of rebuilding and hard facing worn tractor parts, notably rollers and idlers. Questions as to rebuilding procedures for top carrier rolls have recently become more and more frequent, according to Stoody Co., Whittier, Calif. As an answer to these inquiries, Stoody Co. has given the following advice.

The carrier roll, although it has much the same appearance as the larger roller on which the tractor



Top: Worn top carrier roll. Bottom: Top carrier roll after rebuilding

runs, is usually of cast iron rather than steel and hence not generally considered suitable for rebuilding by the automatic process. In the case of cast steel rolls, automatic welding, using a wire such as Stoody 105, produces the best results.

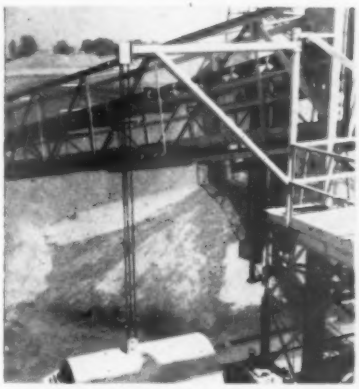
For cast iron top rolls, it has been found that the most satisfactory procedure is the manual application of an electrode having properties particularly suited to the rough usage these rolls get. Such an electrode is Stoody 1027 with its high impact strength and resistance to severe abrasion. On a tractor operating in mud, top carrier rolls will often freeze up and, by the time they are freed, the track has worn a flat spot; when rolls rebuilt with Stoody 1027 stick, it is claimed that wear is much less and that usually no flat appears. Costs of labor and material for rebuilding are considerably below replacement price, and the service life is said to be usually superior to new parts.

Convenient Hoists

THE TWO ILLUSTRATIONS of hoists shown at right were both taken in the same plant. One is a lighter weight type and its primary function is to lift the cover off a large motor used to drive an 8- x 12-ft. rod mill. In a time of emergency, or to expedite oiling and/or inspection of the motor, a hoist like this is almost a necessity. The boom is of welded pipe construction. It is hand operated.

The second illustration is of a heavier type of boom which was used for hoisting repair and replacement parts to the top of the plant. The boom is of the truss-type and the unit is power-driven.

Most any welder can make either type and their use can make any plant operate more efficiently.

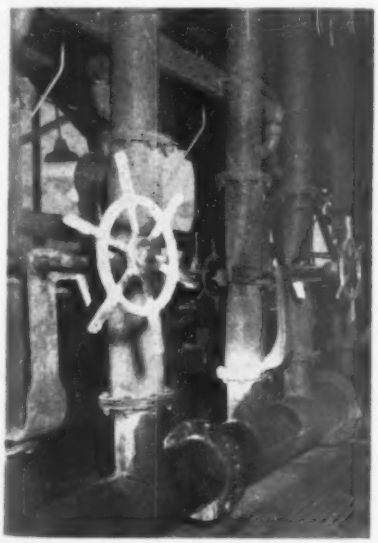


Left: Hand-operated, light weight type hoist. Right: Heavier type boom, used for hoisting repair and replacement parts

Pinch Valves on Wet Cyclone

PINCH VALVES are quite old but their use and advantages, for some unknown reason, appear to have gone practically unnoticed. Perhaps they are too simple and one might be inclined to class them with "gadgets." However, where abrasion due to type of pulp being handled is a factor, pinch valves can do a job where other types of valves fail or require excessive maintenance.

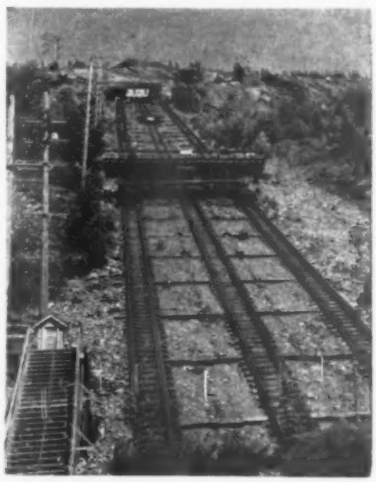
The assembly shown here is used on a battery of DorrClones. These cyclones handle a dilute pulp and make a sand-slime separation under pressure. They appear to have many possible uses in the rock products industry, but when handling abrasive pulps, control of the pressure within the cyclone is one of the reasons for the success of the separator and, as shown in the illustration, pinch valves using a rubber sleeve roughly 6 in. in diameter are used.



Pinch valve arrangements used to control quantity and pressure to cyclones

Car Lift

IN THE NORTHWEST where a dam is under construction, the concrete aggregates are secured from a pit below the construction site. The aggregates are first hauled by standard railroad equipment to the car lift shown in the illustration. When the carload of aggregates is spotted on the lift, the car is pulled up the incline by means of a large counterweight, plus an electric motor. When it reaches the top of the incline, another locomotive pulls the car to a transfer station where the aggregates are loaded to barges and towed across an artificial lake to the dam site.



Carload of aggregates is pulled up incline by counterweight and electric motor

The lift can handle 80 tons of aggregates and makes the round trip in about 15 minutes. The outside rails on the incline support the lift, while the center rails carry the counterweight.

Portable Pump

A NEW PHOSPHATE OPERATION in Florida uses a feed pump to deliver material to a feed scrubber. This scrubber discharges into a small pond. A second pump delivers the material from the pond to the final washing plant.

The illustration shows the second pump in the Florida set-up. It is a 15-in. unit and, like all the field pumps at this operation, the pump and its drive motor are mounted on a steel sled for portability.

Pump unit mounted for portability

New Machinery

ROCK PRODUCTS

Transformers

GENERAL ELECTRIC CO., Schenectady, N. Y., has announced a new line of general-purpose, dry-type transformers featuring Class B insulation. The company reports that for single-phase, 60-cycle operation, the new design provides smaller transformers at an average weight reduction of 30 percent throughout the line, with some models weighing less than half as much as the units they replace. These features are obtained, the engineers have stated, through the use of improved core steels and increased amounts of inorganic insulating materials.

Single-phase transformer

Lightweight Tractor

AMERICAN TRACTOR CORP., Churubusco, Ind., has introduced a new crawler tractor, the GT30 Terratrac, powered by a 4-cyl. Continental F-140 engine. The company reports that, when fully equipped with hydraulically activated bulldozer and angle dozer, the GT30 weighs less than 4400 lb. Special rubber track shoes were designed for the tractor, permitting it to take advantage of its 4.98 m.p.h. third speed.

Multi-purpose crawler tractor

Water Repellent

THE MONROE CO., INC., Cleveland, Ohio, has developed a silicone base liquid water repellent for uncoated exterior masonry walls. Known as Monoseal, this liquid is claimed to penetrate from ¼ to ⅜ in. into masonry surfaces and to provide water repellency for many years. It is a transparent, colorless thin liquid which the manufacturer states protects yet does not alter the surface appearance in any way. Only one coat is necessary, applied either by brush or spray.

Liquid repellent applied to masonry surface

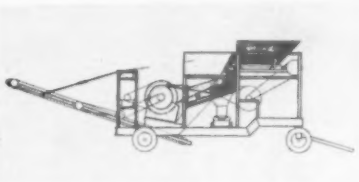
Extends Tractor-Shovel Line

THE FRANK G. HOUGH CO., Libertyville, Ill., has announced an addition to its line of integral tractor-shovel units. This new size, designated Model HAH, has a ½-cu. yd. bucket, front wheel drive, and full reversing transmission. The top speed forward is 14 m.p.h. and top reverse speed for carrying full loads is 23 m.p.h. The manufacturer states that the maximum dumping clearance of 7½ ft. permits loading big trucks, and that loads can be dumped at any point of the lift, at either slow or fast speeds.

Tractor-shovel unit with ½-cu. yd. bucket

Portable Aggregate Plant

DIAMOND IRON WORKS, INC., Minneapolis, Minn., has designed a single pass gravel plant for use wherever aggregate specifications are of limited restrictions. Available in three plant sizes, the single circuit unit is said to be for use expressly by counties and townships for the processing of gravel for construction of secondary roads and for small jobs which require frequent moving. Capacities, based on 25 percent oversize passing a 1-in. screen, are approximately 20-24 t.p.h. for the No. 116 plant, 48-60 t.p.h. for the No. 120, and 50-65 t.p.h. for the No. 124 plant. An 18-in. wide sand rejector conveyor is optional equipment.



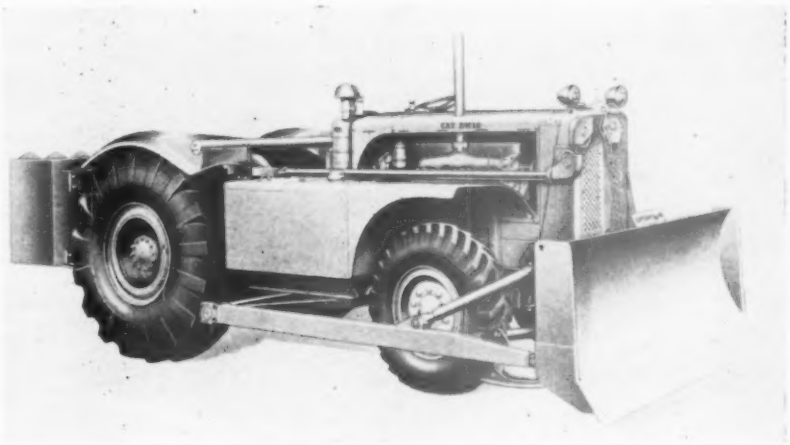
Single pass gravel plant

Anti-Rust Paint

PAINT CORP. OF AMERICA, Cleveland, Ohio, has announced its PCA-100 paint, said to contain penetrating and sealing anti-rust ingredients which can be applied right over rusted surfaces. Suitable for both interior and exterior use, the new paint is reputed to be equally effective in preventing rust on new metal or stopping rust action on present rusted metal. The paint is available in black only and may be applied either by brush or by spray.

Extends Bulldozer Line

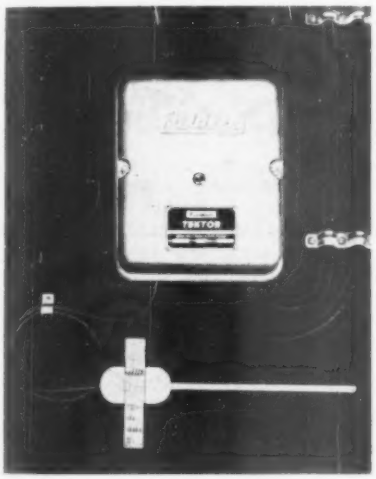
CATERPILLAR TRACTOR CO., Peoria, Ill., has announced the production of its No. 10S bulldozer, a straight blade attachment for use with the company's line of DW10 tractors. Similar in design to other Caterpillar bulldozers, the components of the 10S include the blade, push arms and braces, hitch, sheave support and heavy-duty radiator guard, combination cable and sheave group. The trunnions are included in the weight box and frame group, which is fabricated of heavy structural steel plate mounted in conjunction with the tractor frame. Included in the assembly is a heavy box, at the rear of the tractor, to accommodate four counter weights weighing 7000 lb. They are offered separately as an attachment. The No. 21 cable control is used with this bulldozer.



Straight blade bulldozer attachment

Level Switch

FIELDEN INSTRUMENT CORP., Philadelphia, Penn., has announced a switch that is said to make possible level control of practically all liquids and solids. Liquids may be of high or low viscosity and may have electrical conducting or insulating properties. The company reports that the switch, Model AJ-1 Tektor, is housed in a dust-tight, splash-proof, die-cast aluminum box, 6½ x 7½ x 4 in. deep, with screw-on cover. The electrode, connected to the instrument probe, is 4-6 in. long, ¼-⅜ in. in diameter, and is inserted into the container at the level at which control is required.



Level control switch

Mining Motors

WESTINGHOUSE ELECTRIC CORP., Pittsburgh, Penn., has in production a totally-enclosed, explosion-proof d-c mining motor, either non-ventilated or fan-cooled. It is said that it will withstand an internal explosion, and will not ignite an explosive mixture outside the motor. These motors feature all-steel construction with one-piece rolled steel frames. Speed range is from 850 to 3500 r.p.m., with ½- to 20-hp.

All-steel mining motor

Protective Respirator

MINE SAFETY APPLIANCES CO., Pittsburgh, Penn., has developed its Comfo respirator, which is said to provide protection for workers in all industries where toxic or fibrosis-producing dusts are hazards. A new type mineral wool filter is featured which is said to require less than half the filter area and to offer only half the breathing resistance of previous models with the same dust collecting efficiency.

Twin Pinion Motor

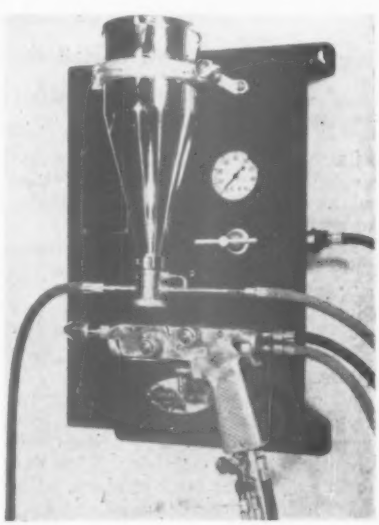
U. S. ELECTRICAL MOTORS, INC., Los Angeles, Calif., has developed its new twin pinion Syncrogear motor, which is claimed to have doubled the effective torque rating of a conventional single pinion and gear unit. The motor incorporates the use of a splined herringbone pinion to divide the load equally between the two secondary pinions. Ratings are available from 5-25 hp. and with speeds from 30-84 r.p.m.

Forced Draft Fan

PRAT-DANIEL CORP., East Port Chester, Conn., has developed a forced draft fan which is said to embody many features that improve aerodynamic characteristics and efficient conversion of velocity to static pressure. The company reports that precisely shaped backward curved blades are designed to offer an efficient aerodynamic flow across the leading and trailing surfaces, further contributing to the smooth flow of air through the fan.

Spray Welding

WALL COLMONOY CORP., Detroit, Mich., has announced a new model of its Spraywelder, a powder metallizing unit used to execute the Colmonoy process of spraywelding. This process consists of applying uniform overlays of hard-facing alloys using metallizing procedures, and then bonding the overlay to the base metal. In addition, it is said that the Spraywelder can be used to apply metal casting such as copper, brass, stainless steel, aluminum and zinc.



Powder metallizing unit

Aerial view of the Libby, Mont. vermiculite mine. Primary plant is at right center; mill feed conveyor from this plant emerges from mountain (center) and discharges at processing plant at lower left

Mining Vermiculite Ore for National Distribution

Zonolite Co., Chicago, Ill., excavates mountain of vermiculite at Libby, Mont., and ships high grade ore to expansion plants

THE VERMICULITE INDUSTRY was developed by men willing to gamble, and as recently as the late 1920's, there were few definite facts on which to base a prediction that an industry would ever grow out of this strange material. Today, it is an important industrial commodity, primarily an insulating material, but with a wide range of other uses.

Vermiculite is a form of mica. A chunk of crude ore contains thousands of paper-thin sheets. Trapped between these sheets and within the mineral are water molecules. When the ore is exposed to heat at about 2000 deg. F., this water turns to steam, causing the layers to separate and move apart. The granules expand from 12 to 15 times their original size; in the process, thousands of tiny dead air cells are formed. These provide most of the insulating properties of expanded vermiculite. The remainder comes from the shiny surfaces of the layers, which reflect radiant heat as a mirror reflects light.

The excellent fire resistance, insulating ability, and permanence of expanded vermiculite were shown in a spectacular picture story in *Life* magazine recently. Dominion Steel Co. of Nova Scotia made steel history by shipping a 65-ton ingot white hot, buried in vermiculite in a flat car. The glowing metal was taken from its mold, placed on a bed of vermiculite, and quickly covered with more vermiculite. Workmen walked around on the 1800 deg. F. metal with only a 2-in. covering of vermiculite. Although the 200-mile rail trip took 22 hours, the ingot lost only 150 deg. of its original temperature. The vermiculite insulation is saved and used for other ingots. Hot shipment of the steel saves two months' processing time, and is now standard procedure at this mill. Dominion secures its vermiculite from Zonolite Co. of Chicago.

Deposit

The ore comes from the largest and purest vermiculite deposit on this continent, located about seven miles northeast of Libby, Montana. The deposit is a rounded mountain, 4200 ft. high, almost all of which contains vermiculite. The entire top of the mountain is being mined off in benches 16 ft. high. About 125 ft. have been removed from the top thus far.

The first step is to get rid of that part of the deposit that does not

contain a substantial quantity of vermiculite ore. Three Northwest power shovels, one of 1¼-cu. yd. capacity and two of 2-cu. yd. capacity, are used. Waste material is disposed of by 12-ton Euclid and Linn trucks. The Linns are equipped with crawler tracks in the rear. Vermiculite ore is soft and spongy, and the half-track type of equipment is more satisfactory in wet weather. These trucks dump the waste over the side of the mountain. About 8 tons of material are discarded to salvage 1 ton of ore. The waste is moved currently, so that the entire level is advanced.

Conveyors

Ore that meets requirements is hauled by the Euclids or by the half-tracks to a primary plant at the edge of the deposit. Here it is dumped over grizzlies that separate and reject the large rocks. The smaller material goes down a chute 192 ft. deep inside the mountain, and on to a 24-in. conveyor belt, 1300 ft. long, that takes the ore to the mill. About 500 ft. of this conveyor is also inside the mountain. The remaining 800 ft. is covered for weather protection. The conveyor carries about 350 tons of crude vermiculite an hour to the mill.

In the mill, the material is run through large oil-fired rotary dryers. It then passes over batteries of vibrating screens and through a number of crushers. Finally, a series of air separating devices segregate the lighter vermiculite from the heavier impurities. This highly complex system of screening, crushing, and separating is controlled by numerous interlocking automatic devices. Assayers are on duty 24 hr. a day, testing ore samples, expanded vermiculite and rejected material. The latter is taken by another long conveyor system to the tailings pile.

A dump car, or skip, carries the finished ore from the mill to storage bins still lower on the mountain side. The car travels on a narrow-gauge railroad track; as a full car goes down, it draws up an empty one from the lower storage point. Which bin the ore is dumped into depends on the size of the particles, and is selected by remote control at the mill.

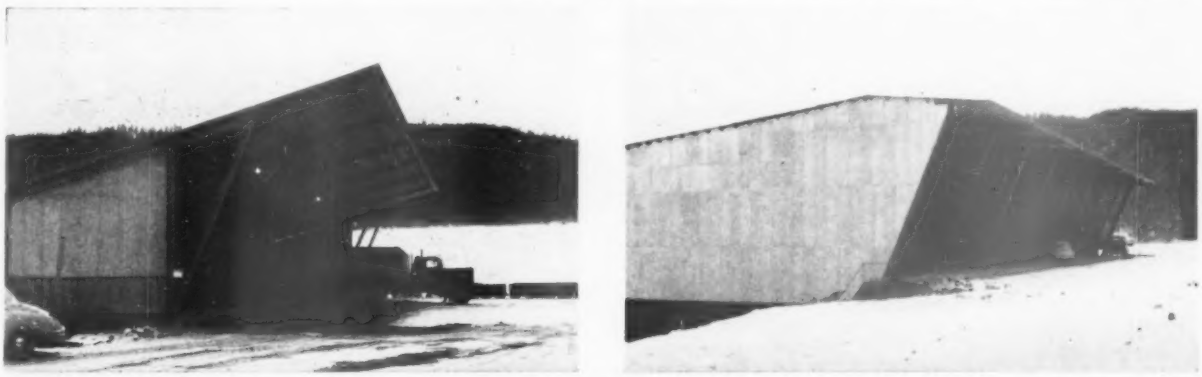
Aerial view of the mountain top at Libby, Mont., location of one of the purest deposits of vermiculite in the world; the mountain is 4200 ft. high, almost all of which contains vermiculite. The benches are 16 ft. high

From this storage point, 25-ton Kenworth trucks take the ore to storage bins on the bank of the Kootenai River. Here, there are 6 bins, each of 75 tons capacity. In addition, three auxiliary storage bins of 5000 tons capacity each guarantee shipment of concentrated vermiculite when it is needed.

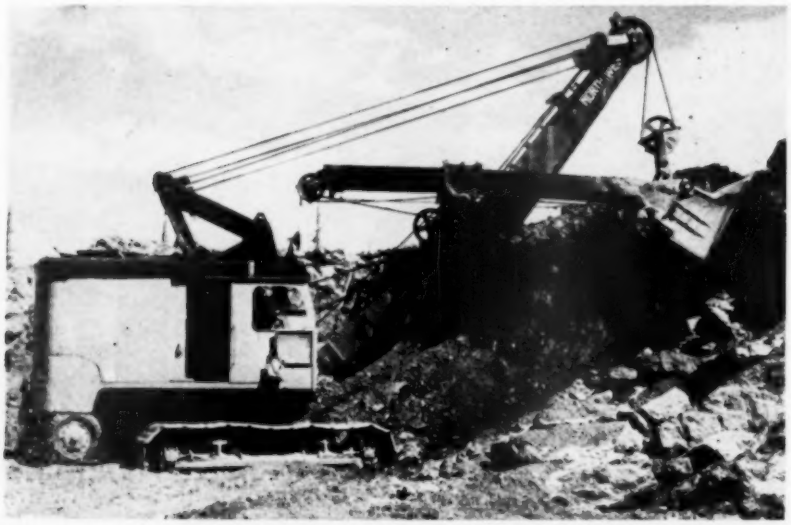
Suspension Conveyor

The mine and mill are on the far side of the Kootenai River with relation to the Great Northern Railway's trackage, and the ore was formerly trucked across the Libby bridge to track-side storage bins. About a year ago, however, a 440-ft. belt conveyor suspended from cables was erected over the Kootenai to carry ore across and load it directly into box cars. The conveyor is a most unusual installation. The majority of suspension bridges consist of a span that supports a rigid floor on which traffic is carried; but in this installation, the traffic is carried directly on the cables. The span consists of a 24-in. belt, covered to protect it from the elements, a catwalk, and a handrail. The installation has been tested in extremely high winds, and found to have almost no vibration. Structural engineers who have visited the job say that it is quite unlike any they have ever seen, and praise it highly.

Closeup of covered mill feed conveyor as it emerges from the mountain



Storage bins for vermiculite concentrate on the banks of the Kootenai River. Left, the six-bin storage unit with a capacity of 75 tons per bin, and at right, the three-bin storage unit with a capacity of 5000 tons per bin. Belt conveyor runs under bins and across river to the rail shipping head



Power shovel loading crude vermiculite ore at the Libby mine

Suspension belt conveyor across the Kootenai River near Libby, for transporting vermiculite concentrate from the processing plant to rail shipping point

The entire system of ore handling at the river, including the conveyor, was designed and built by Zonolite engineers under the direction of John B. Myers, vice-president of the company, who has headquarters at Libby.

When ore is taken from the river storage, power draggers draw it forward to the front of the bins, which have gates in the floor. The ore drops down by gravity to an underground belt that feeds the river conveyor. Selection of ore for loading is a push-button operation. The operator sits in an office across the river, adjoining the railroad siding, and determines what type of ore is to cross by throwing switches and plugging into a control panel. No manual handling of the ore is involved at any point after it leaves the mill. One hundred tons of ore cross the river per hour.

As the ore comes off the river conveyor, it hits a small centrifugal loader that is set up in the box car before loading is started. The ore strikes this loader, and is thrown to one end of the car. When that end is full, the loader is faced to the opposite end. This end-loading makes it easy to board up the door of the car. The ore settles and levels out during its rail journey to the processing plant. It takes only 30 minutes to load a car. Over a million tons of finished vermiculite ore have been shipped from Libby to date.

Also operated at the mill site is one of the most complete machine shops in the Northwest. Much of the original mill equipment was made in this shop, and most repairs are also handled here. The Libby operation includes a pilot expanding plant to determine the efficiency of new plants as they are designed and built. Expanded vermiculite processed in the pilot plant is sold to a small surrounding trade area through established building material channels.

Uses of Vermiculite

As already indicated, expanded vermiculite has a wide range of uses. It is well established in the construction industry as a free-flowing insulating fill for homes and buildings of all kinds, including cold storage plants; as an aggregate replacing sand in lightweight plaster and concrete, and as an incombustible acoustical treatment. It is used as a medium for germinating seeds and propagating cuttings; for soil and fertilizer conditioning; as an extender in paint and bronze; a lubricant; insulation for high temperature refractory surfaces; as poultry litter; insulation for underground steam lines; as packing for baked goods, porcelain ware, dangerous chemicals, bulbs, plants, and many other products, as a snuffer for magnesium incendiary bombs; and as a sprayed-on, anti-sweat coating for the hulls of ships. Continuous research is constantly developing other uses.

The processing of vermiculite ore will be described in the second part of this article.

Kentucky Fluorspar

THE GEOLOGICAL SURVEY has announced the availability of a geologic map of the western Kentucky fluorspar district. The mapped area, covering parts of Livingston, Crittenden and Caldwell counties, is part of the Illinois-Kentucky fluorspar field which is the source of about 75 percent of the U. S. domestic fluorspar production. The geologic investigations were made between 1920 and 1929 by Stuart Weller and A. H. Sutton for the Kentucky Geological Survey, and the mapping was modified in part between 1943 and 1947 by A. H. Sutton.

The geologic map indicates the distribution and structure of the various rock formations and is accompanied by a short explanatory text. Most of the commercially important fluorspar deposits occur as veins along steeply dipping normal faults, but in some places masses of fluorspar have replaced parts of adjacent limestone beds. Some "gravel spar" deposits are found where the veins were weathered near the surface. Galena and sphalerite, ore minerals of lead and zinc, are abundant in some veins, and considerable zinc ore has been stripped as a by-product from some of the veins.

The map is printed on a topographic base at a scale of 1 in. to a mile and is being released as Mineral Investigations Field Studies Map (MF-2). Flat or folded copies may be obtained, prepaid, for $.50 each, through the Chief of Distribution, Geological Survey, Washington 25, D. C., or through D. J. Jones, State Geologist, Kentucky Geological Survey, University of Kentucky, Lexington 29, Ky.

The tailing pile in Solitude Gulch forms a dam across the valley, the crest of which is about 4000 ft. long

CONTROL OF TAILINGS FROM WASHING PLANTS

Part VI. Miami Copper Co., Miami, Ariz., has tailing pile over 4000 ft. long and 200 ft. high; good design of materials handling system has resulted in very little maintenance expense

By WALTER B. LENHART

IF ONE WERE LOOKING for superlatives in tailing control the work being done by Miami Copper Co., Miami, Ariz., could possibly qualify, for here in one single tailing dam are over 80,000,000 tons of tailings. The dam retaining this fine material crosses a comparatively wide valley and the dam itself is made up of nothing but the finely ground rejects from the copper concentrating mill. If one takes into consideration the tonnage of material going to make up this huge dam, it possibly can qualify as one of the largest dams in the world, for it is built up of the 80,000,000 previously mentioned tons of material. By comparison, Hoover dam on the Colorado river has 7,000,000 tons of material (concrete) in it. Both are true dams across canyons with a single face. The tailing pile of Miami Copper Co. is over 4000 ft. across its crest, is over 200 ft. high and the slime pond behind the dam is more than 7000 ft. long.

Tailings are controlled here because of state law requirements and to recover as much of the water as is possible. To re-use it is essential. There is a small amount of copper remaining in the tailings and it is remotely possible that at some future date when economic conditions are quite different from the present day, and a newer technique is developed to recover residual copper, this material may again be processed for its copper content.

This tailing installation should be of extreme interest to the rock products industry not only because of the technique involved in building the structure, but because it shows that tailing disposal must be a planned and well-thought-out program if it is to endure over a long period of years. It will also show what the mining industry has had to face in the matter of expense in carrying out a long range tailing disposal program. Although the tonnages handled here are possibly far in excess of any that plants in the rock products industries may have to handle, the methods at Miami, on a much abbreviated scale, may have many features that could apply to these smaller tonnage operations.

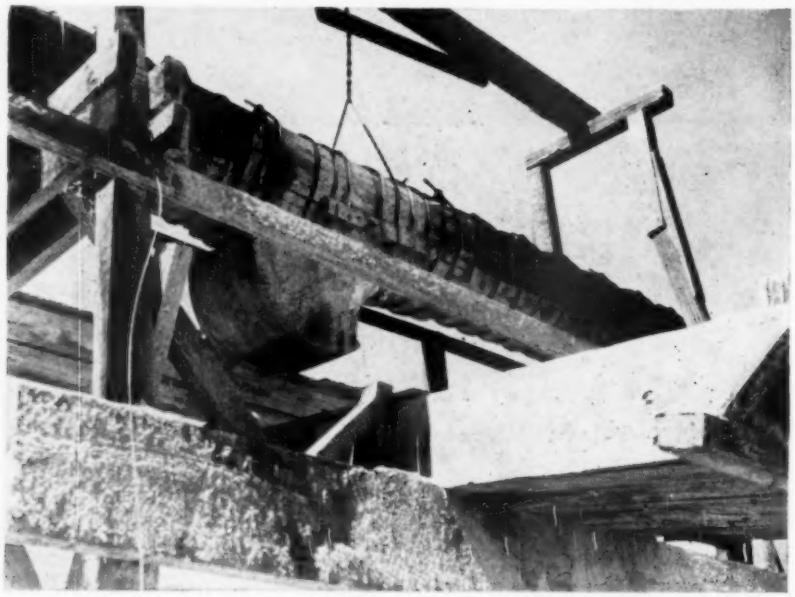
The outlet gate in the pipe line has here been opened to full volume. The "wash" formed the small arroyo

The valley or canyon, in which the Miami Copper Co. now disposes of its tailings, is roughly three miles from the mill. It is referred to as "Solitude Gulch." Each day some 13,000 tons of finely ground ore go to the tailing pond. The pulp carrying this material is 52 percent solids, so there is roughly 26,000 tons of pulp being handled there each 24-hr. day. The pipe line carrying this material is mostly 18-in. dia. steel-banded redwood pipe that has been in service for 20 years or more.

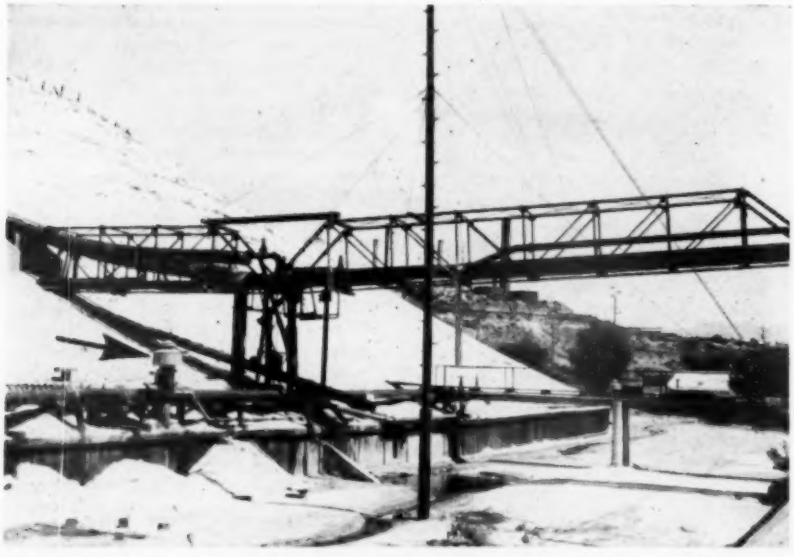
Gravity Flow Line

The pulp from the mill contains 33 percent solids and this is thickened in a 325-ft. Dorr thickener to 52 percent

The pipe line in center of picture skirts a small hill; this part of the line is the most distant from the mill



One of the molasses gates on the outlet of the line that forms the dam in Solitude Gulch



Tailing line is carried over the highway on this steel trestle. Arrow points to one of the many pumps around the toe of the unused pile

solids, after which the pulp is pumped a vertical lift of about 41 ft. The material then flows by gravity across the top of an older, and previously used, pond (now bone dry) through an 18-in. dia. wood pipe that has a slope of 0.8 percent. At the outer rim of the dry pond the line takes a steep drop of over 200 ft. (vertical) through a section of steel pipe. This pipe carries the pulp across U. S. Highways 60 and 70, the Southern Pacific railroad tracks and back up to the opposite rim of the valley, at the bottom of which are the two previously mentioned transportation systems. This is a U-shaped inverted siphon. Steel pipe is used here because of the pressure-vacuum conditions. From the crest on the rim opposite the old pond, the tailings flow by gravity (0.8 percent grade) through an 18-in. wood line, and this part of the line passes through 13 tunnels. In the entire system there is a total of 15 tunnels to accommodate the pipe line. The total length of these tunnels is 4002 ft. In addition there are 1620 ft. of open cut, 2035 ft. of steel trestles, 1140 ft. of shallow trenches, and 5060 ft. of wood trestles.

At the outset of tailing operations in Solitude Gulch, the pulp issuing from the throat of tunnel No. 15 was carried to the disposal site by gravity, but as the years went by and the crest of the dam grew in height it became necessary again to pump the tailings, so a second pumping station was established near the outlet of tunnel No. 14 and the pulp was lifted to its present elevation. Tunnel No. 15 is now out of service as far as the general tailing disposal system is concerned. By referring to the photographs here that show the general outline, one can get more of the details of this highly engineered tailing disposal system.

Similar to several of the copper mining and milling operations previously discussed in connection with tailing disposal, the ore of the Miami Copper Co. is a porphyry which is ground in ball mills and the copper minerals removed by flotation, after which the tailings are stored. The solids in the pulp have a specific gravity of 2.61 and have the following screen analysis:

	Accumulated percentages
Plus 48 mesh	2.0 percent
Plus 65 mesh	12.0 percent
Minus 200 mesh	50.0 percent

The alkalinity of the pulp is equivalent to 0.005 percent free CaO per ton of solution and the pH is approximately 9.0. The solids in the pulp after drying are light gray in color and after exposure for years they assume a yellowish tinge. They are not at all harsh to the touch, yet, with this apparently highly unsuitable material for building a tailing dam, a structure has been built that has served the

plant since 1929. Prior to that time, a pile was in use near the mill and is the one over which the pipe line now passes. Highways 60 and 70 follow the toe of this great pile for a quarter of a mile or so and one corner of the pile juts into the edge of the little town of Miami. Erosion of the face of this old dike is surprisingly small.

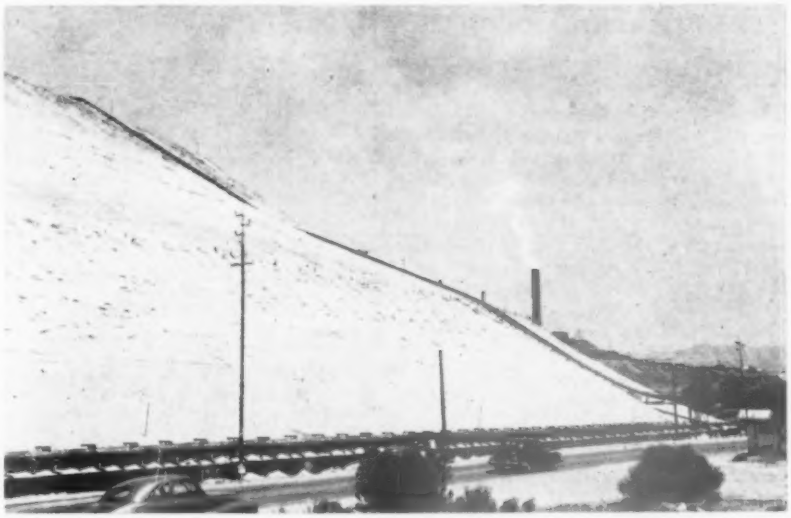
We will confine this discussion to the pile now in use in Solitude Gulch and related procedures.

The floor of the valley or arroya in Solitude Gulch is a comparatively loose and porous gravel and up to 100 ft. thick. According to the operators, this type of base structure is ideal for tailing disposal purposes for it affords a quick drainage of water from the solids, thereby helping to consolidate them, and in some cases a high dike is utilized to good advantage (see methods used at Castle Dome Mine).

Wells and Shafts Utilized

With the base structure as it is, no water is pumped out from behind the dike, nor is any form of decant line needed, all the water seeping into the gravel under the area. To recover this water a series of 14, or more, wells was provided outside the toe of the dam and these wells fanned out over this area below the face of the dam. Later, however, two shafts were put down near the rims of this gravel-bearing section and the bottom of the shafts connected by a tunnel. Then churn-drill holes from the surface were put through the gravel bed so as to drain into this tunnel. All the water gathering in the drainage tunnel was recovered and pumped back to the Dorr thickener in a steel-banded redwood pipe line that practically parallels the pipe line used for the tailings. The churn-drill holes were allowed to cave and the finer gravel removed. Flash photos were taken of the caved area; when they had belled out to the desired size as observed in the photographs, the holes were refilled with coarse cobbles (about 6-in. gravel) so that additional drainage into the holes (and tunnel) was afforded (Fig. 2).

An unusual feature of the tailing disposal dam or dike is that the wood trestle over the berm area has the same slope as the berm. In other words the berm has a slope of 0.2 percent and the pipe line is parallel to it, thus it, too, is on the slope of 0.2 percent. This tends to throw the pulp and slimes against the mountain shoulder that forms the far side of the pond. As the pulp going into the line over the berm is pumped, and under some pressure, the 0.2 percent grade is permissible, but where the flow is by gravity the grade is kept at 0.8 percent and the line does not sand up. The wear on such a line with this high gravity pulp is not a serious cost factor. On the discharge side of both pumping plants, and near the crests



This is the face of a pile that went out of service in 1929. Very little erosion has taken place. The pipe line going down the face is to the present disposal area

of the higher lifts, vents have been provided in the line to release entrained air. The vents in the line also serve as a pulp release should a choke-up occur at points beyond the vents. At the lowest point in the entire line (near the toe of the old tailing pond dike and where the steel siphon is in effect) an automatic drain arrangement has been provided so that both legs of the line can automatically drain themselves during an emergency.

To drain off excess water that might accumulate in front of the dam during a heavy rain or cloudburst, two storm drain tunnels have been provided. A third tunnel has been plugged off as it is now so located as to be unsuited for the needs, for as the pile forming the dike grew in height this tunnel became buried deeper and deeper, so rather than build up a high weir the two present tunnels are relied upon for drainage of storm waters. Both these tunnels go through shoulders of the mountain range that form the sidewalls of the pond and drain into adjoining arroyas. The inlet portion of these tunnels is a vertical concrete riser section that is built up by weirs, the tops of which are just a trifle higher than the slime part of the area. Normally, no water goes over these weirs, but should a flash flood occur the excess water can pour over the weirs and into the tunnels and be drained away, thus not endangering the berm of the dike.

The trestles over the berm of the dike are initially 30 ft. high, which allows four years of operation before the pipe line has to be raised. The trestles are made with 4 x 6 legs and adequately braced so as to withstand wind conditions. The bents are on 10-ft. centers. A walkway is provided as well as night lights in the form of occasional flood lights. An operator is kept on the dike on all three shifts. Near a centrally located spot a small "dog house" has been provided that contains a heating stove and telephone. An amplifier on the crest of the dike is a part of the telephone system so the operator can hear the ring while out on the job. Having a telephone available is sound practice, for the operator, if in trouble, can quickly call for help.

The face of the dike is kept at a slope of 1½ to 1 and the wet or slime

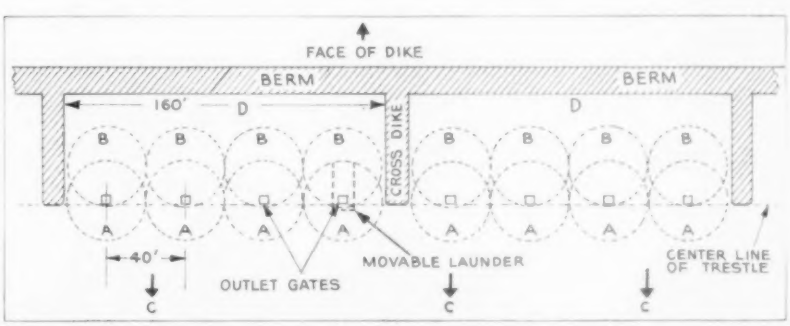


Fig. 1: Method by which concentric piles of sand are built up in the 3-sided sectors by the gates and the movable launders under each gate

section of the pond slopes in the 2 to 5 percent range from the horizontal. The trestle system is inside the berm and is kept back a distance of roughly "H," plus 15 ft., where "H" is the height of the trestle at that point. Obviously, as the pile grows in height, all of the trestle structure becomes buried in the sand and is lost. Across the face of the dike and about halfway between the toe and the crest of the berm a roadway has been provided. This was made by simply offsetting the berm the desired distance (about 60 ft.) so as to make a shoulder to accommodate the roadway. It is used "as is" without hard surfacing and parallels the berm. Soon a second and higher roadway across the face will be provided.

When the present pipe line has been used to the point where it is partially buried in the muck it will be raised. At that time a short stub pipe line will be installed as a temporary pulp outlet and the stub line used while the main one is being progressively raised. Constructing a trestle almost a mile long and in excess of 30 ft. high and remounting the 18-in. pipe line on top of it is no small undertaking.

Discharge Gates

The pipe line on the trestle is unloaded through company-made molasses gates. In one type the inlet throat of these gates is sloped to better receive the flow of pulp. The opening in the gates is roughly 10 x 12 in. and the gate assembly is strapped to the wooden pipe with a handle extending upwards so the operator can reach it from his walkway on the trestle. The gates are quite heavy, and to help support their weight a superstructure has been provided over each opening and some of the weight of the gate absorbed by wire slings from this superstructure. The gates are on 40-ft. centers. One advantage of wood

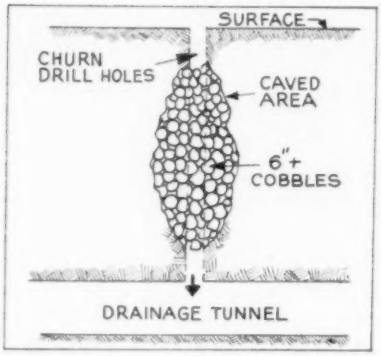


Fig. 2: Additional drainage has been obtained in the disposal area by allowing churn drill holes to cave in, then filling them with cobbles

pipe is that it can be easily cut and a gate put at any desired location.

Under each gate is a movable and wide launder that can be pointed in the general direction of the berm. This enables the operator to place the pulp stream at the most advantageous spot.

The berm of a dried out section of the pond is built up with a small tractor and dozer to a height of 3 to 4 ft. Every 160 ft. a cross-dike is made that extends from the berm to the foot of the trestle. As many of these 160 ft. (and adjoining sections) are built up along the berm as are necessary to handle the current production of pulp. By referring to Fig. 1, it will be noted that an overlapping series of concentric piles of the coarser sands in the pulp can be built up either by letting the pulp "spit" straight downward, or by use of the small launders under each gate. When these piles of sand are built up almost as high as the berm, that section near the berm (marked D) might have too many slimes in it, so the operator opens one or more of the gates wide. This tends to wash some of the sand closer to the berm. Or if he so desires he can leave the gates open wide for a longer period of time and wash the slimes and a considerable portion of the sand back towards the settling area, or in the direction of the arrow (C). This tends to spread out the sand portion over a wider area that can mean a more solid dike. The manipulations in detail are decided on mainly by the operators (one per shift) who from years of experience have learned how to place the pulp stream to the best advantage. Very little hand shoveling is done except to trim up the face of the berm, for it is kept at a uniform slope and looks very neat and systematic.

When the 160-ft. sections behind the berm are filled to capacity, a more distant part of the berm has by this time dried out and a tractor has prepared the section to receive more pulp. Then the new section of the dike is put into use and the one just described allowed to drain and dry out. Owing to the length of the berm this section can dry out from a few weeks to a month or more, should it be desired. Thus only a small section of the dam is wet at any one time and this is considered a good safety precaution.

Rains do not soak up the face of the dike to any extent and erosion in general is negligible. During heavy winds there is some dusting. Nothing is added to lessen this. At one time application of lime to the face was tried. This produced a crust that was helpful, but children dug holes in this crust, the wind got under it, and the final decision was to not use any additives.

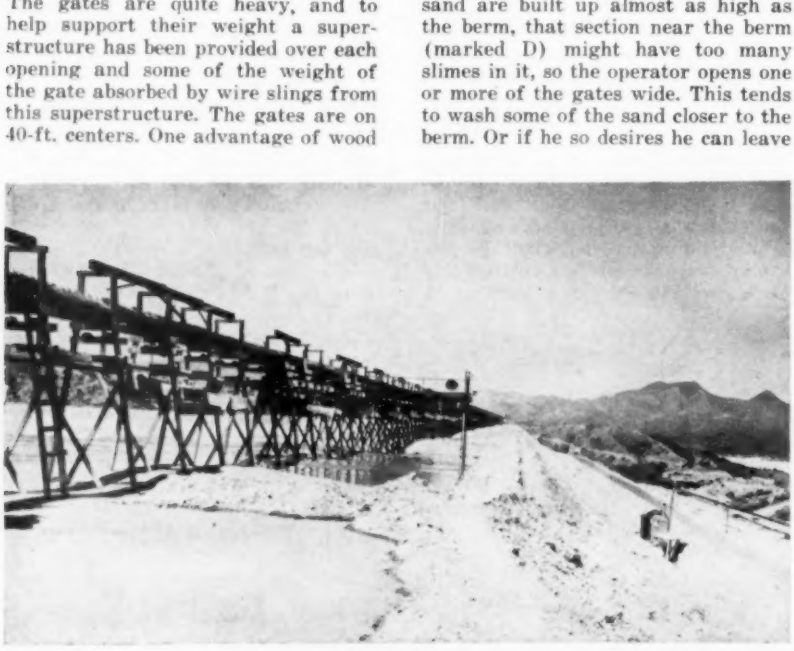
One day each week the line is shut down and drained into a small emergency pond nearby. The line never sands up and is never flushed out. The return water line builds up on the inside with incrustations and these are removed from time to time by a "go-devil."

Tailing Control System

The 325-ft. Dorr thickener which is a part of the initial tailing control system receives its feed from the mill via an Armco steel U-shaped launder on a 1 percent grade. The thickener is the traction type and make-up water from various sources is pumped to this thickener and discharged into it at a point about midway between the receiving well and the outer weir. By handling the water in this manner, any lime, iron salts, etc. in either body of water have an opportunity to react and to precipitate out salts that might otherwise cause incrustations in the pipe lines. The clear water is then sent to screens to remove any floating foreign matter, after which the water is put back into service.

The thickened underflow from the thickener is received by four 10-in.

(Continued on page 104)



This section of berm in use at time of inspection. Note the wing-walls that are thrown up at right angles to the berm

EVALUATION AND DEVELOPMENT OF KILN EFFICIENCIES

Part VI. Quadrants suggested as solution to poor efficiencies of rotary kilns

By VICTOR J. AZBE*

THE CRITICAL ZONE of a cement kiln is the section in which the plastic semi-fluid mass tricalcium silicate (C_3S) forms and the critical heat is that which creates a temperature in excess of 2375 deg. F., the approximate initial point of C_3S formation.

In the case of lime kilns the critical heat is that which creates a temperature in excess of 1500 deg. F., which is the approximate initial point of CaO formation.

Heat Requirements

In neither case would there be much accomplished unless there was a substantial amount of heat above these levels, creating the much higher temperature and higher temperature differential which are required for a good heat transfer rate.

In the case of cement kilns it is especially important that there is high temperature elevation above the initial point required, to initiate the C_3S forming reaction. The effect of such temperature rise is quite different and far more rapid for argillaceous cement rock than for ordinary limestone, clay or shale, silica and iron ore mixes.

In the case of argillaceous cement rock, many of the reactions forming some of the silicates, aluminates, and ferrates are taking place almost as soon as the calcium carbonate is converted to CaO and while still in the solid state. In the case of the artificial mixture, fusion must have been initiated before a sufficient degree of intimacy of contact is established for any of the reactions to proceed at a rate satisfactory for good cement kiln operation.

This seems to place a considerable burden on the cement kiln when compared to the rotary lime kiln, which is mitigated by the fact that all of the cement clinker-forming reactions are exothermic and, while some heat is necessary for fusion, this is far offset by heat generated by the combinations. We may say that in the overall, as far as combustion products are concerned, there is no heat required other than to maintain a high enveloping temperature.

In the case of lime, on the other hand, a large amount of heat is needed at the reacting point. The cement kiln also has this endothermic reacting point, but in its case only approximately two-thirds is lime and one-third non-calcareous material, which contributes to the thermal process.

Thus, in the case of cement a higher or a lower temperature may be required in the sintering zone, and a longer or a shorter time of retention, dependent on mineralogical constitution of the mix. But be that as it may, conservation of exothermic heat within the sintering bed is important as any loss of heat will reduce the temperature, retard fusion, prolong reaction time, and may affect quality of the cement or at least the capacity of the kiln.

Since the clinker bed temperature may be somewhere between 2400 and 2800 deg. F., and since the gas temperature is well above 3000 deg. F., no heat can be lost to the gases except at the discharge point before the gaseous stream has acquired its high temperature.

Heat is absorbed by the wall and lost by radiation, however. How much? That depends on the nature of the stone and the sintering bed temperature that is required for reaction velocity and time of retention, and on the amount of exothermic heat that is developed. While fusion takes place more readily with argillaceous rock and a lower temperature of the bed is required, with such rock less exothermic heat is developed within the sintering zone. In consequence high temperatures, while less necessary, are also less readily possible and in such a case it seems that the wall loss factor would be more serious in proportion.

Still, in calculating the extent of the sintering zone, the wall outer exposure, its surface temperature and resulting heat loss, and correlating them with the exothermic heat generated within the zone, it seems that the wall loss is not serious in itself if not amplified by some other loss of heat.

Rotary Kiln Deficiencies

This brings us up to the second most serious handicap to which the rotary kiln is subject. The first is lack of surface to absorb the heat. The second is the zonal overlap, which permits entrance of residual $CaCO_3$ into the sintering zone where its endothermic requirements defeat the exothermic influence. This condition becomes more pronounced with increased forcing of the kiln.

In the ideal kiln there should be a uniform temperature through the entire bed and, to one side of an imaginary ideal line, one temperature and one dissociation state would prevail. To the other side of this line there would be another, higher temperature, no $CaCO_3$, only CaO, and such combinations with CaO as may have formed at the lower temperature.

Actually this is far from being the case. Neither is the bed of uniform cross sectional temperature or of uniform cross section analysis. There is a tendency to size segregation, and heat penetrates only with difficulty to some of the sections of the bed. So these sections are at relatively low temperature regardless of how hot the gaseous stream and the surface of the bed may be.

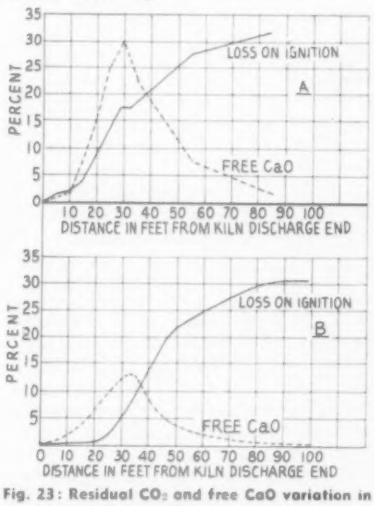


Fig. 23: Residual CO_2 and free CaO variation in a cement kiln bed. Data from (A) Lacey & Woods (Bogue) and (B) Hans Gygi

Referring to Dr. Bogue's "The Chemistry of Portland Cement," page 91, the graph by Lacey and Woods gives free CaO and loss on ignition at various points in a cement kiln. This shows, at the point of maximum CaO content 30 ft. from kiln discharge, the rather startling figure of 17 percent loss on ignition. Even 10 ft. from the discharge point there is 2 percent loss on ignition or 4.55 per-

*Azbe Corp., St. Louis, Mo.

cent carbonate as calculated on the cement clinker basis.

We combined this figure from Bogue, which plainly applies to limestone, shale, silica feed, with a chart by Gygi developed on a kiln clinkering argillaceous cement rock, Fig. 23 A and B. These charts bring out in interesting contrast what was stated above. In one case all of the exothermic reactions took place in the sintering zone and in the other only those requiring a liquid state or approximately so.

It will be noted that in Gygi's case, $CaCO_3$ is also carried into the sinter zone although to much lesser extent. However, since less exothermic heat is developed here, it may do more harm and so may prevent full attainment of the advantages inherent in having argillaceous rock.

Some of the $CaCO_3$ may be resistant to calcination, requiring a higher than theoretically assumed temperature to complete dissociation within the same range of time as the bulk of the mass. There is only a few percent of this calcination-resistant portion, not sufficient, we believe, to be much of a factor at the very highest temperature prevailing in the hot zone of a cement kiln, but which may be quite a factor toward terminating calcination in a lime kiln and preventing obtaining the highest CaO lime.

A second factor which probably is related to the above is occlusion. Limestone cannot convert to lime unless CO_2 can escape and, for this, porosity is demanded. A porous state is obtained in the ordinary course of calcination as succeeding layers calcine, become oper, and thus permit escape of CO_2 from the inner regions. If, however, the surface layers are sintered before all of the CO_2 has escaped then tremendous pressures are entailed for completion of the process and are attained only through much higher temperature.

Thus whether limestone is naturally resistant or becomes resistant through surface sintering and densification, the explanation is the same. There is obstruction to CO_2 escape. These may be factors in lime kilns and also cement kilns but there also is a third factor, size stratification and nonuniform heating. This may outweigh the preceding two by far.

A rotary kiln will classify its size fractions in accordance with their weights, and only through calcination and consequent change of weight will the various sizes change their respective positions. This is governed not by the size, big or small, but rather by the size range between the biggest and the smallest particles, and is further influenced by the circumferential speed of the kiln, depth of bed and whether the bed rolls over, slides on the kiln bottom, shears on its rotational center or is a combination of these.

The tendency of the rotary kiln to classify material results in the larger fractions being exposed to higher temperatures, receiving more heat and calcining faster than the smaller of the fractions. In the case of lime kilns this has been determined and results of some of the tests are presented in Fig. 24.

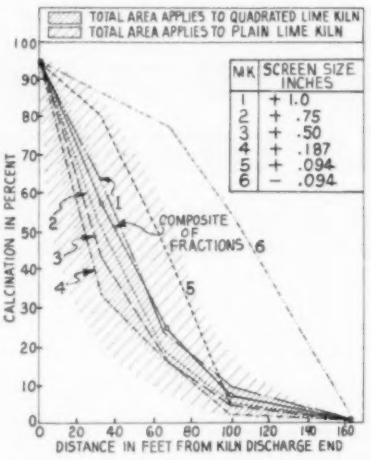


Fig. 24: Rate of calcination of various lime fractions

Samples were withdrawn, not once but repeatedly, from various points of an operating kiln. These were screened into six sizes and each size was analyzed separately. The range in percent of calcination, in the case of a conventional rotary kiln, that is, one without any sort of inserts, extended over the width of the total shading of the figure, and only 30 ft. from the discharge end, there were fractions 23 percent calcined and others 85 percent calcined.

In this study, the smallest of the fractions were well calcined. Most of this smallest part did not come from the original feed, but was mostly material resulting from abrasion and as such should be left out of consideration. The normal smallest size range was the least calcined and the larger was the most calcined, and more so than it appears since the abrasion portion was lost.

It is this occurrence which carries $CaCO_3$ to the very outlet of the rotary lime kiln and also carries $CaCO_3$ into the clinkering zone of cement kilns. It is a condition suspected by the author to the extent that patent rights have been applied for, for segmentation of the hot zone.

Quadrants

This was never properly proved until the author acquired a most progressive client who offered every assistance and spared no reasonable expense to obtain this information. The client was willing to do something about it. Quadrants were inserted in the hot end of the kiln for a stretch of 20 ft. beginning at 100 ft. and extending to 80 ft. from the kiln discharge end. This is an experiment which we believe will prove of historical importance to all users of the rotary kiln and probably far more to the cement industry than any of the others.

The kiln was placed in operation and similar fractional tests were run. Results showed the wide shading to have been condensed to the narrow denser streak. Excepting for the abrasion material, present in inconsequential amounts, the larger sizes "1" still calcined faster than the smaller "4" but the difference was far less. If quadrants had been installed for a length of 40 ft. instead of 20 ft., all sizes would have been close to being equally calcined.

The quadrants do more than this as was pointed out in Part III of this series of articles. They confer on the rotary kiln an increased amount of heat absorbing surface in the high temperature zone, correcting one of its two main inherent faults. Here we demonstrate that its other main fault, the "zonal overlap" is also corrected and, through the correction of these, the rotary kiln becomes virtually a new, compact and efficient machine.

One is inclined to assume offhand that, in the case of a rotary kiln, we have one temperature differential head to deal with, that being the differential between the gases and the material. Actually there are three, between gases and material, from the flame exposed bed surface to the coolest part of the bed, and across the nodules themselves. Of these the last two are ordinarily ignored but have an important bearing on performance of the kiln.

The elementary assumption is also that preheating takes place first. Then when that is completed, calcination begins. Unfortunately however, this is not so. Portions of the bed calcine long before other portions are preheated, and surface calcination of a nodule has begun before its inner part is fully preheated. This means that in both cases the inner preheating was with heat of a higher temperature level and capable of making lime, or, in the case of the clinkering zone, with heat capable of heating up the bed and speeding up the clinkering reaction.

Another consideration is that the CO_2 escaping from the calcining center of the nodule is first heated up to the surface temperature of the nodules and, before escaping from the bed, it is further heated up to the highest temperature of the bed. Then, finally, it is still further heated up to the temperature of the general gas stream.

Thus heat has to be supplied to the bed not only for the calcination reaction but also to supply the requisite amount of heat of preheating and to heat the escaping CO_2 to the temperature of the bed. The cooling effect on the bed may be considerable. It is harmful in the calcining zone

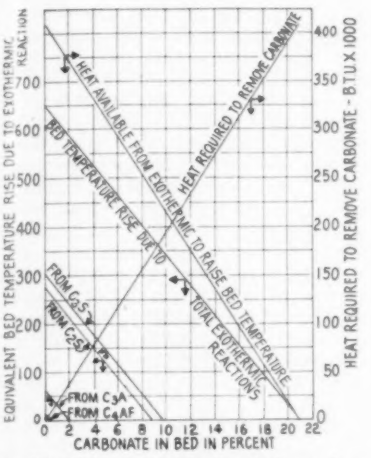


Fig. 25: Calcium carbonate dissociation equivalent in exothermic clinkering reactions

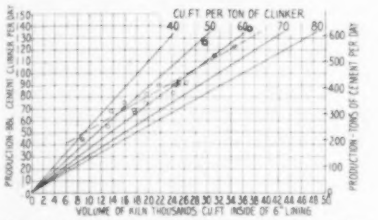


Fig. 26: Volumetric efficiency of some rotary cement kilns

and far more so in the sintering zone.

Fig. 25 aims to present the effects of delayed calcination in the sintering zone. Let us assume that all the exothermic heat is generated in the sintering zone. Production of good clinker at a good capacity rate is dependent on the temperature of the bed. If there is no loss of heat, the exothermic reaction can raise the temperature of the bed by 650 deg. F., but only half this range is as much, since 10 percent of $CaCO_3$ enters the zone.

We do not aim for location of quadrants within the hot zone, of course, nor even close to it at the end of the calcining zone. They serve their purpose quite well by having them further back, terminating the structure where calcination is about half complete. Their effect would be to give a more uniform calcination of all of the fractions all the way to the end of the calcining zone as Fig. 24 demonstrates. A further effect would be earlier termination of calcination and beginning of sintering, thus leading to a much higher kiln capacity.

The rotary kiln is inefficient, performance is poor and waste gas temperature is high. All sorts of effort are expended to cool the gases through better preheating. Something is accomplished but, in the scale of overall thermal efficiency, it is too little since it is impossible to correct at the back end of the kiln the imperfections that prevail at the front end. All that the preheater does is to improve the functioning of the preheating zone. It does not correct the imperfections, the thermal deficiencies of the cooling, sintering or calcining zones and it is these deficiencies rather than the preheating zone which are principally responsible for the kiln inefficiency.

Zones

First in importance is the cooler. Next are the sintering and calcining zones of the kiln proper and very little of consequence is being done to improve the efficiencies of these latter zones. Kilns are being made larger in diameter and ever longer. They are made somewhat better, are of higher capacity (Fig. 26), of somewhat higher thermal efficiency (Fig. 21 and 27), but the improvement is not a volumetric improvement and, in spite of the still low overall thermal efficiency, progress attained is very little. To improve the cement kiln truly there must be a means of reducing the thermal and chemical overlap in the bed and of reducing the external temperature differential at these junctions. There is nothing in sight that would accomplish this, short of a perfected vertical kiln, except through the use of suitable segmented inserts in a rotary kiln.

Fig. 28 presents temperature gradients of a rotary cement kiln of average performance. The more glaring imperfections are: At "A," the entrance point to the sintering zone, the temperature differential through the bed is very high, due in part to delayed calcination "B" and partly because, due to size segregation, the gases in the calcining zone fail in the uniform heating of the bed. This is a condition which delays permissible discharge of the clinker as, in the case of lime, it delays permissible discharge of the lime.

Material surface temperature is high so gas temperature is also high, since heat has no place to go but to the bed. Temperature gradient is too great. If that would be reduced the picture would change; the clinkering zone would shorten and the gas temperature would drop. Segmental inserts would accomplish this, even though they were located well back from this zone.

Segmental inserts would also draw temperature differentials "C," "D" and "E" at the incipient calcination point well together, reducing the overall difference by more than half. In addition the distance between "A" and "C" could be substantially shortened, because, if additional surface is incorporated, neither the kiln length nor kiln diameter need be so great. In turn this makes segmentation more practical than it would be ordinarily.

In spite of its being a wet process operation, the temperature at "F" is so high because of an accumulation of imperfections in operation of the cooler, clinkering, and calcining zones

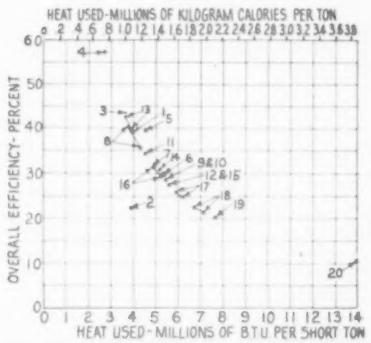


Fig. 27: Thermal efficiency of various cement kiln systems (after Anselm). Numbers referred to are (1) Shaft kiln, 14 percent H_2O, (2) Rotary kiln, 9 ft. 10 in. x 197 ft., 60 percent limestone, 40 percent blast furnace slag, 6 percent H_2O, (3) Lepol kiln, 10 ft. 6 in. x 105 ft., 60 percent limestone, 40 percent slag, 14 percent H_2O, (4) Shaft kiln with oxygen, 14 percent H_2O, (5) Sinter machine, 14 percent H_2O, (6) Rotary with chains, 10 ft. 6 in. x 493 ft., 35 percent H_2O, (7) Rotary with preheater, 35 percent H_2O, 9 ft. 10 in. x 207 ft., (8) Rotary with waste heat boiler, 9 ft. 10 in. x 220 ft., 6 percent H_2O, (9) Rotary with chains, 9 ft. 10 in. x 233 ft., 35 percent H_2O, (10) Rotary and slurry jet, 9 ft. 10 in. x 305 ft., 35 percent H_2O, (11) Rotary with preheater, 9 ft. 10 in. x 197 ft., 14 percent H_2O, (12) Rotary with slurry filter, 9 ft. 10 in. x 197 ft., 20-35 percent H_2O, (13) Rotary, 9 ft. 10 in. x 233 ft., waste heat boiler and waste heat dryer, 6 percent H_2O, (14) Rotary, 9 ft. 10 in. x 220 ft., with predryer using kiln gases, 6 percent H_2O, (15) Rotary normal, 9 ft. 10 in. x 220 ft., 6 percent H_2O, (16) Rotary, 9 ft. 10 in. x 226 ft., waste heat boiler and slurry filter, 20-35 percent H_2O, (17) Rotary with waste heat boiler, 9 ft. 10 in. x 220 ft., 35 percent H_2O, (18) Rotary, 9 ft. 10 in. x 207 ft., with waste heat boiler forced, 35 percent H_2O, (19) Rotary normal, 9 ft. 10 in. x 256 ft., 35 percent H_2O, (20) Electric melting furnace

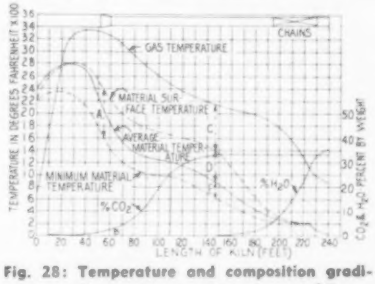


Fig. 28: Temperature and composition gradients of an average rotary cement kiln

which no preheater could correct and which can only be corrected at their source. Effectiveness of a preheater has a local effect mainly while an effective cooler wields its influence all through the kiln. Segments exert their beneficial influence both forward and backward from their exact location.

Objections may be offered to the statement on the effect of size stratification, claiming that initial nodules all break up. What happens exactly we do not know but for one reason or another there must be stratification, otherwise at the high temperature supposed to prevail, CO_2 could not be retained. Whatever the reason, it is a matter of poor mixing which

segmentation effectively overcomes.

In the study of lime temperature gradients as compared to cement kiln temperature gradients and, considering the calcining zone only, it appears that this zone performs more effectively in the case of lime kilns than in the case of cement kilns even though the cement kiln gas temperature is considerably higher. What peculiarity is responsible for this condition? Is it a condition of the lime kiln bed tending to give better exposure to the heat than the cement kiln bed, or is it a matter of flame characteristics? The latter may possibly be the answer, for in a lime kiln the flame in the finishing zone is highly luminous and more conducive to heat transfer while in the cement kiln it loses much of its radiant heat qualities in the sintering zone. Thus, even though the temperature of gases entering the calcining section of a cement kiln is higher, their heat radiating powers may be lower. Such a condition again would suggest the value of segmental kiln inserts because the lower the heat radiating powers are, the greater is the need of heat absorbing and transmitting surface.

Thermal Efficiency

Fig. 27 is a very interesting chart. It was drawn from data compiled and tabulated by the very capable Wilhelm Anselm, consulting engineer to the German rock products industries. The chart presents heat requirements per ton of clinker plotted against kiln thermal efficiency. It covers a widely varied group of kilns ranging from shaft kilns to an electric fusion furnace.

There is but one unit of all of them which has fairly high thermal efficiency. It is a shaft kiln operated with oxygen. The latter must be of rather high purity since CO_2 content of the escaping gases is 85 percent. All of the kilns are around the 40 percent efficiency point as Nos. 1, 3, 5 and 13 had some special process feature. Most of the kilns were 30 percent efficient or less.

Is a condition such as this not a tremendous challenge to the engineer who has the responsibility to improve performance? The situation can be corrected if some view points are changed.

To begin with it is necessary to evaluate a heat loss properly, to place it in the proper perspective. The approach to this for lime kilns was covered in the first part of this series. For cement the principle for such rational evaluation is not much different, except that in the case of cement the nature of the solid components coming down the kiln is such that they have a greater ability to cool the gases than in the case of lime.

The required heat input for wet and dry process operation is given by Fig. 29, showing the chemical heat combined with the sensible heat as

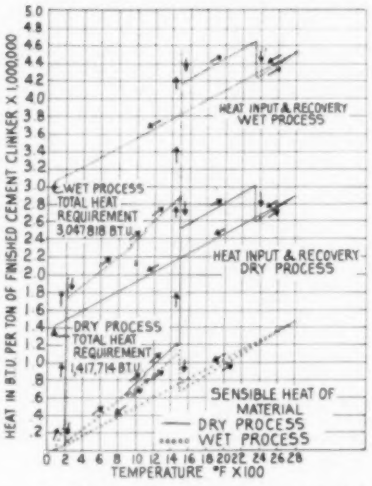


Fig. 29: Wet and dry process cement kiln bed total heat input and recovery; also sensible heat content of material

well as the sensible heat alone. If the clinker would be cooled completely, then in the dry process only 1,417,714 B.t.u. would have been required for the particular mix here assumed. This is only the net of the reaction heat since all of the sensible heat is recoverable. At 100 percent thermal efficiency, this represents over 18 tons of clinker for a ton of good coal, while ordinarily a mere five tons may be actually obtained.

This illustration shows that the value of clinker cooling is just about equal to the net heat of reaction, which is a rather startling fact. If we assume that the kiln cooling of the clinker is useful, which we are not altogether certain is true, and the clinker is being discharged at 2400 deg. F., in its cooling to 72 deg. F. 2,670,000 — 1,417,714 or 1,252,286 B.t.u. are released or 88.5 percent of the net heat of reaction.

Assuming a kiln producing five tons of clinker per ton of coal, with coal of 26,000,000 B.t.u. per ton and a cooler of 50 percent efficiency, returning but half of the heat to the kiln, the cooler loss would be:

$$5 \times \frac{1{,}252{,}286 \times .50}{26{,}000{,}000} \times 100$$

$$= 12.04 \text{ percent}$$

That seems bad enough and the method of calculation is correct for the compilation of a heat balance, but it does not represent the true loss which is actually far greater.

The heat loss by the cooler is all heat of high elevation and all capable of calcining, and the loss, rather than being 12.04 percent, is

$$\frac{1{,}252{,}286 \times .50}{1{,}417{,}714} \times 100 = 44.15 \text{ percent}$$

The cooler loss in this case is 44.15 percent of the kiln clinker output value, which is the true loss. Then there are the terminal temperature differential loss, the kiln radiation loss, and excess air loss, all of which should be calculated in the same manner. Collectively, they become very great and fully explain why only five tons of clinker are obtained when the utmost attainable is 18 tons.

The contrasting estimate of effect of clinker cooler efficiency on total heat basis and equivalent clinker basis is very revealing and all sorts of conclusions and predictions can be based thereon. It indicates that only through attainment of relative perfection in clinker cooling, correction of thermal zonal overlap, reduction of terminal temperature differential, shortening of the kilns and at the same time greatly increasing their capacity to reduce the radiation loss proportion, that the problem of rotary cement or lime kiln performance will ever be solved.

We have noted that there is no substantial difference in kiln efficiency between the dry and wet processes even though the wet demands some 115 percent more heat. That the wet process is used at all is because the heat would have been wasted anyway. Whether it is the dry process or semi-dry, and whether a filter, chains, or slurry jets are used, thermal efficiency remains the same within a range of a few percent.

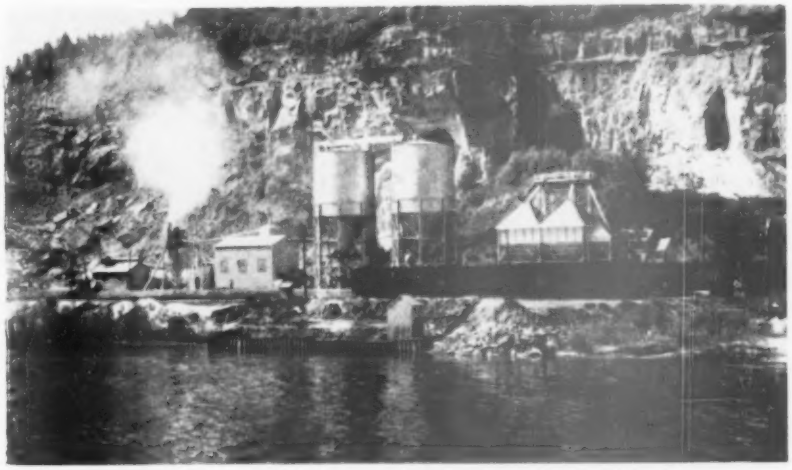
There is some improvement if kilns are made longer but the law of diminishing returns enters very strongly. A gain is made which on the other hand is accompanied by an ever-increasing radiation loss. Even with long kilns thermal efficiency is still around 30 percent.

The author, in his 30 years of study on the subject of calcining efficiency, (and a cement kiln is also a calciner) has passed through all this. The heights of his first lime kilns built in 1925 are still the greatest in this country, but today he obtains a higher capacity and much higher thermal performance from kilns half their height. The improvement came from rationalization of the cooler and incorporation of the center burner. In the case of cement, improvement of the cooler and of the calcining zone will be the eventual solution also.

As the vertical kiln is steadily being improved, so also will the rotary kiln. In the cement industry the rotary undoubtedly will continue the accepted practice on account of the melting factor. In the case of lime it is not certain in either case.

We predict, in the course of more efficient rotary kiln evolution, that other things being equal, the use of the wet process will decline in importance based on thermal performance and that the "long" kiln will be shortened very greatly, the calcining zone will be changed completely and so will the cooling system. With increased amount of clinker to cool and considerably less air with which to cool it, the concept of cooling clinker will be changed.

Clayton Silica Co., Clayton, Iowa, uses wind box instead of vibrating screens for three-way split of silica grain sizes



Clayton Silica Co. plant as seen from the middle of the Mississippi River, which it parallels. The portal in center is for belt conveyor from the underground crushing plant; portal at right is a truck-way

AIR CURRENTS FOR SIZE SEPARATION

By WALTER B. LENHART

IN THE EXTREME northeast corner of Iowa is one of the new industrial sand operations in the United States. It is the plant of the Clayton Silica Co., a subsidiary of Concrete Materials Co. of Waterloo, Iowa. Clayton, Iowa, is on the west bank of the Mississippi river, about 20 miles south of McGregor, Iowa, across the Mississippi river from Prairie du Chien, Wis.

In the vicinity of Clayton, erosion has resulted in high bluffs paralleling the river. The work of the river has exposed bold outcroppings of almost white silica sand overlaid with limestone and surface earths. The bed of silica sand lies in an almost horizontal plane. Clayton Silica Co. mines this bed of sandstone by the conventional room and pillar system. The rooms are about 38 x 38 ft. with a 28-ft. ceiling. Square pillars of sandstone, 45-50 sq. ft. in cross section, support the roof of the working areas.

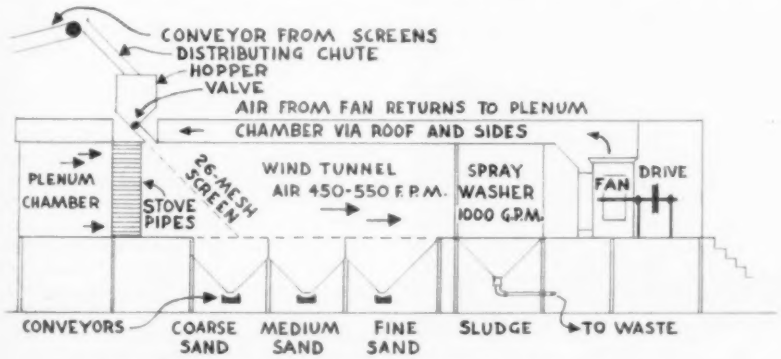
There are two features of the Clayton operation that set it apart from more conventional rock products operations. First, both primary and secondary crushing, as well as the scalping operation, are conducted underground. Loading with a power shovel and a D-2 Traxcavator to trucks and haulage to the underground plant make all of the silica operations ahead of the drying plant a complete mine operation. Second, the use of a company designed "wind box" as a size classifier, in which three grain sizes of silica are produced, is a development that should interest the industrial sand industry.

The sandstone, after blasting, is a relatively friable material. The main loading unit in the mine is a 15-B Bucyrus-Erie shovel with a ½-cu. yd. bucket. It is augmented by the previously mentioned front-end loader. Two Dodge rear-dump trucks haul to the feed hopper serving the primary crusher. In drilling, two miners operate one drill from a "jumbo" or platform that is securely fastened to the lip of a ¾-cu. yd. Northwest shovel. This permits high breast and roof holes to be drilled in the 28-ft. high rooms. The drill operates with water.

The primary crushing unit is a 15- x 36-in. Cedarapids jaw crusher which is fed by a belt feeder from a steel hopper. The throughs from the primary are scalped on one of two Tyrock double-deck vibrating screens. The top deck has ½-in. wire and the lower deck 3/16 in. The oversize from the top deck goes to a set of 24- x 40-in. Cedarapids double-roll crushers, and the oversize from the lower deck to a set of 20- x 40-in. Pioneer rolls. The throughs from both sets of rolls are returned by individual belt conveyors to the belt from the primary crusher. The main offbearing belt is 24 in. wide and the return belts are 18 in. The minus 3/16-in. material is conveyed by covered belt conveyors to a 90-ton steel surge bin which serves the dryer.

The mine has two portals, one in use as an entry way, so that mobile equipment can enter the underground workings. Near the portal, heavy steel I-beams have been provided to protect the ground from caving or sliding. These beams resemble square sets and extend back into the mine about 50-75 ft. The other entry is used for the offbearing belt conveyor from the underground crushing and sizing plant. The operations started in 1947 and since that time have extended the workings over a considerable area.

The plant has an 8- x 60-ft. oil-fired



Cross section elevation of the wind box, showing the principles of operation

The entire crushing plant is underground. Conveyor at left serves the primary crusher; other two conveyors are return belts from the secondary roll crushers

Loading of material for haul to the underground crushing plant is handled by this ½-cu. yd. shovel

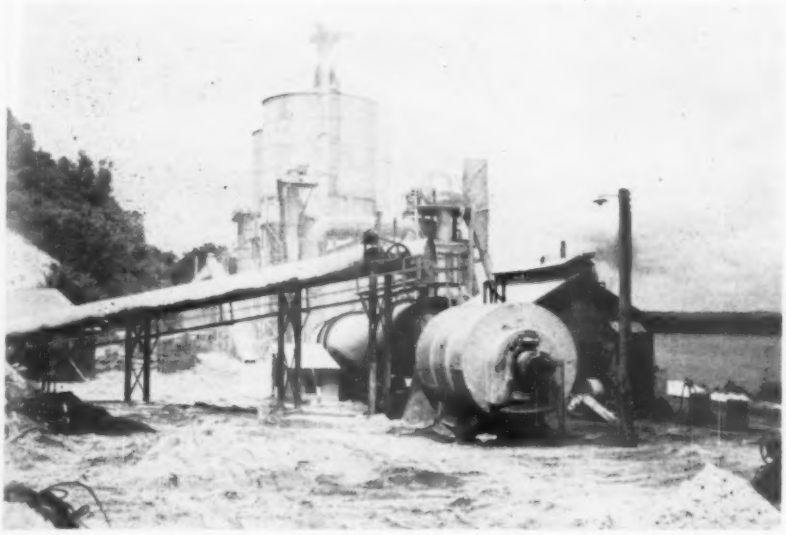
The 60-ft. dryer is in the center of this view, taken from one of the mine portals. Covered belt conveyors serving dryer keep dust at a minimum

Hardinge rotary dryer that is provided with a separate combustion chamber. A Ray oil burner is used. Dust from the dryer is collected by a cyclone-type dust collector. The dried product is delivered by belt conveyor and bucket elevator and split over four Hum-mer screens provided with 26-mesh wire. The oversize material from the screens is put through a set of 18- x 36-in. rolls and is then returned over the vibrating screens. The dry minus 26-mesh material is the feed to the wind box.

Sizing with Air Currents

The wind box is believed to be the first commercially successful application of the principle of separating grains of sand into various sizes by feeding them into an air stream, and is the feature which makes the plant unusual. The difficulty has been to discover a method of feeding the sand into the air stream in such a way that the clusters of sand grains will not fall to the floor before the air can act upon the individual grains. At the Clayton plant the sand slides onto a 26-mesh screen inclined at an angle of about 45 deg., through which screen passes an air stream with a velocity of 450 to 550 f.p.m. The function of the screen is to retard the fall of the sand and to break up sand clusters as the sand dances down the screen.

The box itself is about 40 ft. long, 10 ft. high and 12 ft. wide, with the bottom area of the box divided into three hoppered sections of about equal size. A 4-ft. fan driven by a D-3 Caterpillar diesel engine pulls the air through the wind box. The minus 26-mesh material from the Hum-mer screens falls into the long steel chamber near the head end. The air current plus settling zones result in three gradations: No. 1, 45-50 grain size; No. 2, 65-70 grain size; and No. 3, 90-100. At the head end of the wind box the entire cross section has been filled with 6-in. diameter stove pipe so that the air entering the tunnel is split into a number of entry points, thus reducing eddie currents in the settling zones. The three products are almost pure white in color and appear to be accurately sized. The dust from the chamber passes to a 9- x 14-ft. spray room at the discharge end of the wind box. There are two sets of baffles or eliminator plates in the spray room to break up the direction of travel of the dust stream. These, in conjunction with the water sprays, make a highly efficient dust collecting system. This dust eliminator was furnished by Buffalo Forge Co. The sludge is wasted. Three separate bucket elevators elevate the sized silica sand to steel hoppers under which operates an enclosed blending belt to make shipments over an infinite range of sizes. The bucket elevators were supplied by Electric Engineering & Equipment Co., Des Moines, Iowa.



Conveyor at left carries material from underground crushing plant to dryer in center

The wind box is entirely enclosed, the air from the fan being returned to the entrance end.

Power for the operation is developed by diesel-electric units. This equipment includes a General Motors Series 72, 225 kv.-a. twin unit driving a General Electric generator; a D-88, 50 kv.-a., Caterpillar unit; and a Waukesha-Hesselman driving a 125 kv.-a. Electric Machinery Manufacturing Co. generator. A commercial power line is now being constructed to serve the plant.

Products

The company's production is finding wide acceptance in the foundry trade because of its inherent qualities. The sand runs 99 percent silica. All shipments are by rail, the plant being located on the Milwaukee Road system.

The plant has a capacity of 50 t.p.h. Storage of dried silica is in two steel silos holding 1250 tons each. These may be used for the storage of sand direct from the screen room, for the storage of the graded sand for which the company has the most demand, or they may be used to feed the wind box so that this unit may be kept in operation when the mine and dryer are shut down. This is important because the dryer has a capacity of 75-80 t.p.h. whereas the wind box will not handle more than about 55 t.p.h. The 1250-ton capacity bins are loaded from the roof by an original method that almost entirely eliminates segregation, an important feature when loading from these bins direct to cars.

The only enclosed portions of the plant are the wind box, and the housing over the diesels. Dust is practically non-existent. The plant was designed and built under the direction of T. E. Rust, vice-president of the company. Other officers of the company are F. E. Bellamy, president; W. W. Roberts, vice-president; Gene Mason, sales manager; and Dean Jones, plant superintendent. The parent company, Concrete Materials Co., is one of the largest aggregate producers in the United States, with main offices in Waterloo, Iowa.

False Set in Portland Cement

AN ARTICLE on the subject of false set in portland cement, written by R. F. Blanks and J. L. Gilliland of the U. S. Bureau of Reclamation, was published in the March, 1951, *Journal of the American Concrete Institute*. Because of the pertinency of the article to a problem familiar to ready-mixed concrete producers, National Ready Mixed Concrete Association has secured a supply of reprints. Copies may be obtained by writing to National Ready Mixed Concrete Association, 1325 E. St., N.W., Washington 4, D. C.

The article states that early stiffening may result in difficulties of discharge, placement, consolidation and finishing of the concrete for which the producer is not to blame. Theories of the causes of false set, its effects on the characteristics and quality of concrete and steps which may be taken to reduce the likelihood of its occurring, are all discussed.

Another article on the same subject, presenting a somewhat more technical and specialized point of view, appeared in the June, 1951, A.C.I. *Journal* — "Identification of Dehydrated Gypsum in Portland Cement," by J. L. Gilliland. In this article, Mr. Gilliland points out that false set in portland cement is usually attributed to dehydrated gypsum and that most dehydrated gypsum is due to high grinding temperatures and to storage of hot cement.

Wind box classifier is in building at right; after classification, sand is carried to bins at left, and withdrawn on the covered belt conveyor

Drill platform, or jumbo, is fastened to the lip of a ¾-cu. yd. shovel

Vermiculite Fire Ratings

NATIONAL BUREAU OF STANDARDS has issued new fire ratings for vermiculite plaster column protection and solid partitions, according to a recent announcement by the Vermiculite Institute.

The first is a 4-hr. rating for steel columns protected with 1½ in. of vermiculite plaster over two thicknesses of ½-in. plain gypsum lath, the lath wrapped with a layer of 1-in. hexagonal mesh poultry netting. This supplements a previous 4-hr. rating issued for a 1½-in. thickness of vermiculite plaster on metal lath.

A 3-hr. rating was issued for a 1-in. thickness of vermiculite plaster on two thicknesses of ½-in. plain gypsum lath wrapped with poultry netting. A 2-hr. rating was issued to 1-in. thickness of vermiculite plaster on a single thickness of ⅜-in. perforated gypsum lath with no netting. A 2-hr. rating was also issued to a 2½-in. solid studless partition with a 1-in. thickness of vermiculite plaster on each side of ½-in. gypsum lath. A 1½-hr. rating was issued for the same partition, 2-in. thick.

Detailed drawings of construction assemblies are available from Vermiculite Institute, 208 S. LaSalle St., Chicago, Ill.

General view of the Bull Shoals aggregate plant. Large building at left is the cooling plant. The pile in center is sand. At right is one of the waste piles. The stack is a vent from some of the dust collectors

Belt Conveyors at Bull Shoals Dam Prove Their Economy

BULL SHOALS DAM on the White river north of Little Rock, Ark., near the Arkansas-Missouri state line, is almost completed. However, the work on the construction of the power plant will take about another year. The dam is one of eight proposed for construction in the White river basin. Bull Shoals has received much publicity concerning the seven mile long belt conveyor that transported stone from the crushing plant at the quarry to the final screening and sand manufacturing section adjacent to the damsite. This belt conveyor is currently the longest one in the world that is still in operation (or was at the time of inspection). Its length makes it the second longest ever built, surpassed only by the belt conveyor that was used for transporting aggregate to Shasta dam on the Sacramento river in northern California. This project was completed in early 1945.

A summary of some of our observations on long belt conveyors was published in the June, 1951, issue of ROCK PRODUCTS. The question that is uppermost in the minds of many producers who contemplate a long belt installation can be covered by the sentence: "How do they hold up?" Because of this we purposely delayed our inspection of Bull Shoals so that we might observe what a long belt installation looked like after handling some 4,000,000 tons of minus 6-in. crushed limestone.

Since there are 21 separate flights to this installation a minute examination of each section was impossible. The top and bottom cover and edge damage, due to natural wear, appeared to be negligible. In some sections of the belt, damage from past accidents was apparent, but if these were replaced with vulcanized-joint-replacement sections we would estimate the salvage life of the long belt to be between 85 and 90 percent. Considering the entire assembly, including idlers, head and tail assemblies, etc., the salvage life overall might be estimated to be from 70 to 80 percent.

The installation was designed cooperatively by Goodyear Tire & Rubber Co., the engineering staff of the Flippin Materials Co., and the Ozark Dam Contractors, with M. H. "Harvey" Slocum, veteran dam builder, as superintendent, supervising the design and installation. Mr. Slocum, having had wide experience in the conveying of aggregate at Grand Coulee dam and other large projects, knew what he wanted. He believes that the transportation of any aggregate by belt conveyor is the cheapest and best method of transportation yet devised by man. The Bull Shoals installation has been highly successful and economical.

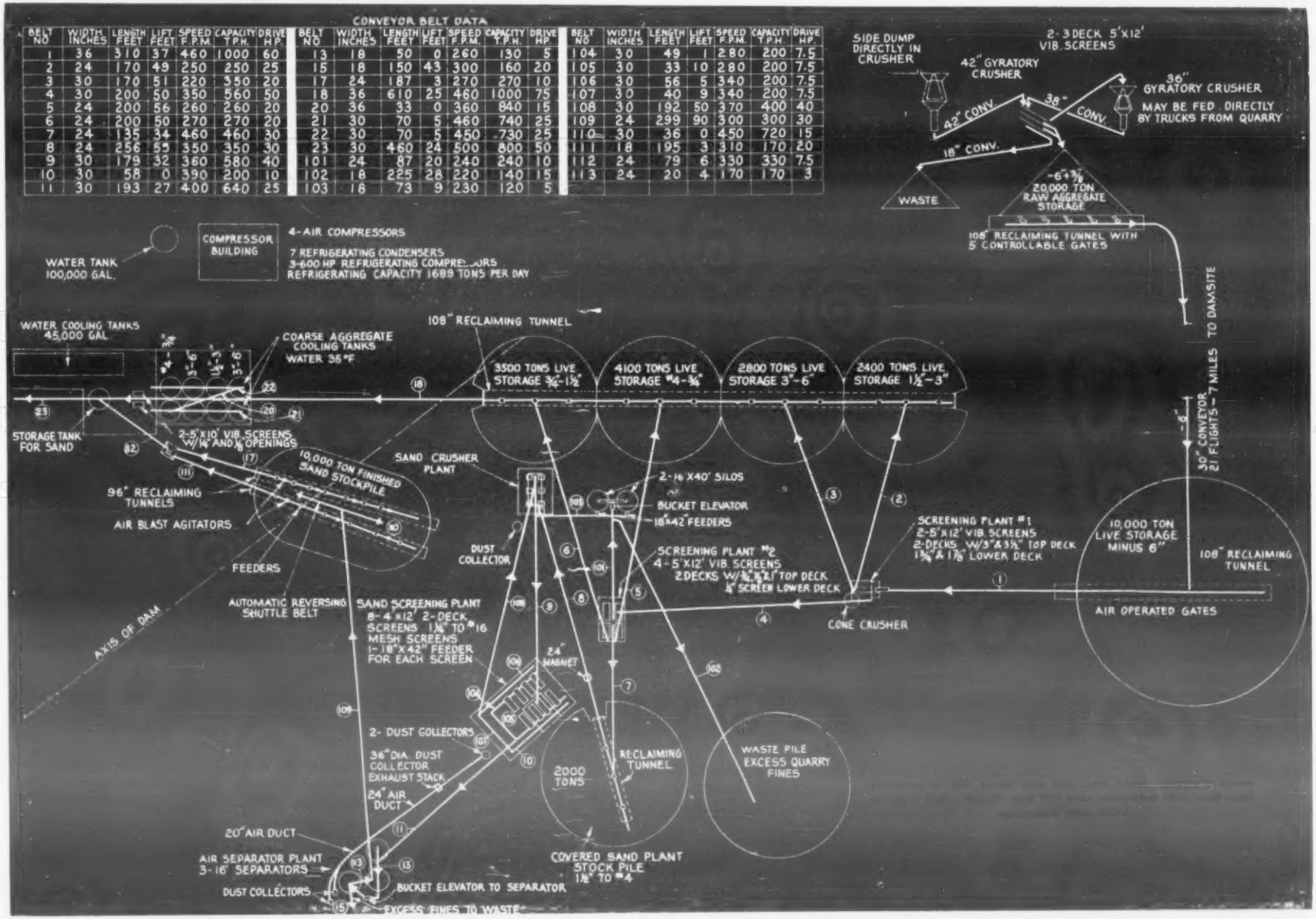
Seven mile long belt conveyor as seen from the quarry. In foreground is surge pile with tractor and dozer pushing 6-in. rock over reclaiming tunnel

The designers chose wood as the supporting structure for the 21 flights because of its economy, ease of fabrication and replacement, and its low expansion or contraction due to weather changes. It was said that if an installation was contemplated for a 10 to 15 year period, wood construction would be the choice. If for longer life than 15 years, wood might still prove to be the best material.

The only real difficulty experienced with the long belt installation was due to lightning striking the motors. This was a chronic source of trouble; on one occasion all three spare motors, kept on hand, had to be put into service because of lightning damage. This, Mr. Slocum said, was entirely a local condition. The long belt operates without cover and rides on Robins idlers. The head and tail assemblies and the take-up mechanisms were supplied by Stephens-Adamson Manufacturing Co. and J. E. Ingram Equipment Co. In addition to the long belt there are, in the processing plants, approximately three miles of belt conveying equipment, ranging from 18 to 42 in. in width.

At the transfer points on the long belt system, the rock falls against an inclined baffle that can change the direction of travel of the rock. After this the material falls almost straight down, onto the offbearing belt. The throats of the openings are comparatively large. It was said that this design, while contrary to many accepted engineering theories, was adopted to insure no pileups at the transfer points and to provide trouble-free operation. Some of the accidents referred to in connection with the belt itself are due to rock jamming up at critical points in the assembly.

Nine men are employed in servicing this system, which has 30-in. belting and operates at 525 f.p.m. with a


CONVEYOR BELT DATA
BELT NO | WIDTH INCHES | LENGTH FEET | LIFT FEET | SPEED F.P.M. | CAPACITY T.P.H. | DRIVE H.P.
1 | 36 | 310 | 37 | 460 | 1000 | 60
2 | 24 | 170 | 49 | 250 | 250 | 25
3 | 30 | 170 | 51 | 220 | 350 | 20
4 | 30 | 200 | 50 | 350 | 560 | 50
5 | 24 | 200 | 56 | 260 | 260 | 20
6 | 24 | 200 | 50 | 270 | 270 | 20
7 | 24 | 135 | 34 | 460 | 460 | 30
8 | 24 | 256 | 55 | 350 | 350 | 30
9 | 30 | 179 | 32 | 360 | 580 | 40
10 | 30 | 58 | 0 | 390 | 200 | 10
11 | 30 | 193 | 27 | 400 | 640 | 25
13 | 18 | 50 | 0 | 260 | 130 | 5
15 | 18 | 150 | 43 | 300 | 160 | 20
17 | 24 | 187 | 3 | 270 | 270 | 10
18 | 36 | 610 | 25 | 460 | 1000 | 75
20 | 36 | 33 | 0 | 360 | 840 | 15
21 | 30 | 70 | 5 | 460 | 740 | 25
22 | 30 | 70 | 5 | 450 | 730 | 25
23 | 30 | 460 | 24 | 500 | 800 | 50
101 | 24 | 87 | 20 | 240 | 240 | 10
102 | 18 | 225 | 28 | 220 | 140 | 15
103 | 18 | 73 | 9 | 230 | 120 | 5
104 | 30 | 49 | 1 | 280 | 200 | 7.5
105 | 30 | 33 | 10 | 280 | 200 | 7.5
106 | 30 | 56 | 5 | 340 | 200 | 7.5
107 | 30 | 40 | 9 | 340 | 200 | 7.5
108 | 30 | 192 | 50 | 370 | 400 | 40
109 | 24 | 299 | 90 | 300 | 300 | 30
110 | 30 | 36 | 0 | 450 | 720 | 15
111 | 18 | 195 | 3 | 310 | 170 | 20
112 | 24 | 79 | 6 | 330 | 330 | 7.5
113 | 24 | 20 | 4 | 170 | 170 | 3
SIDE DUMP DIRECTLY IN CRUSHER
2-3 DECK 5'X12' VIB. SCREENS
42" GYRATORY CRUSHER
36" GYRATORY CRUSHER
MAY BE FED DIRECTLY BY TRUCKS FROM QUARRY
42" CONV.
38" CONV.
18" CONV.
WASTE
-6"+3" 20,000 TON RAW AGGREGATE STORAGE
108" RECLAIMING TUNNEL WITH 5 CONTROLLABLE GATES
WATER TANK 100,000 GAL.
COMPRESSOR BUILDING
4-AIR COMPRESSORS
7 REFRIGERATING CONDENSERS
3-600 HP REFRIGERATING COMPRESSORS
REFRIGERATING CAPACITY 1689 TONS PER DAY
WATER COOLING TANKS 45,000 GAL
COARSE AGGREGATE COOLING TANKS WATER 35°F
108" RECLAIMING TUNNEL
3500 TONS LIVE STORAGE 3/4"-1 1/2"
4100 TONS LIVE STORAGE #4-3/4"
2800 TONS LIVE STORAGE 3"-6"
2400 TONS LIVE STORAGE 1 1/2"-3"
STORAGE TANK FOR SAND
2-5'X10' VIB. SCREENS W/1/4" AND 1/8" OPENINGS
10,000 TON FINISHED SAND STOCKPILE
SAND CRUSHER PLANT
2-16'X40' SILOS
BUCKET ELEVATOR
18"X42" FEEDERS
96" RECLAIMING TUNNELS
AIR BLAST AGITATORS
DUST COLLECTOR
SCREENING PLANT #2
4-5'X12' VIB. SCREENS
2 DECKS W/1 1/2" TOP DECK
1/4" SCREEN LOWER DECK
SCREENING PLANT #1
2-5'X12' VIB. SCREENS
2-DECKS W/3" & 3 1/2" TOP DECK
1 3/4" & 1 7/8" LOWER DECK
10,000 TON LIVE STORAGE MINUS 6"
108" RECLAIMING TUNNEL
30" CONVEYOR 21 FLIGHTS - 7 MILES TO DAMSITE
FEEDERS
AUTOMATIC REVERSING SHUTTLE BELT
SAND SCREENING PLANT
8-4'X12' 2-DECK SCREENS 1 1/4" TO #16 MESH SCREENS
1-18"X42" FEEDER FOR EACH SCREEN
CONE CRUSHER
AXIS OF DAM
24" MAGNET
AIR OPERATED GATES
2- DUST COLLECTORS
36" DIA. DUST COLLECTOR EXHAUST STACK
24" AIR DUCT
2000 TONS
RECLAIMING TUNNEL
WASTE PILE EXCESS QUARRY FINES
20" AIR DUCT
AIR SEPARATOR PLANT 3-16' SEPARATORS
DUST COLLECTORS
BUCKET ELEVATOR TO SEPARATOR
COVERED SAND PLANT STOCK PILE 1 1/2" TO #4
EXCESS FINES TO WASTE

Concrete batching plant at damsite; long belt conveyor in background

Section of the 7-mile belt conveyor and the access road alongside

Minus 6-in. material is processed at the damsite into four sizes and stored in these stockpiles; hammermill building is at lower right

Sand plant storage pile (1½ in. to No. 4); reclaimed feed goes to hammermills

rated capacity of 650 t.p.h. Five of the 21 flights develop sufficient power to operate themselves plus a small amount of additional power. There are approximately 14,000 Robins one-shot lubrication idlers in the assembly. They are 3-tube-shaped and are on 4 ft. centers with self-aligning idlers at strategic points.

As to costs, it has been stated: ". . . the total cost of the conveyor, including clearing the rugged, rolling terrain, building a light road over which equipment could be brought, running power lines and installing motors, cost of conveying machinery and idlers, cost of 75,000 ft. of standard rubber-covered cotton fabric belt and installation, all totaled slightly less than $1,750,000, at present day replacement price."

It was further said that the first cost of 30 trucks, (if they had been used instead of the belt conveyor system) and a road heavy enough to support the traffic would have been about $500,000, plus the labor costs. The repairs to the assembly were estimated at about $75 per month.

The Bull Shoals operation, in its entirety, features a quarry on top of Lee's Mountain with a 20,000-ton storage pile of minus 6-in. rock at the quarry. At the unloading end of the long belt is a second raw storage pile of 10,000 additional tons. In the interplant storage there are four storage piles for as many sizes of crushed and sized rock, each pile holding 2800 to 4100 tons. In addition there is a storage pile ahead of the sand manufacturing section, and finally, a large storage pile of finished sand. The total is about 55,000 tons of storage available.

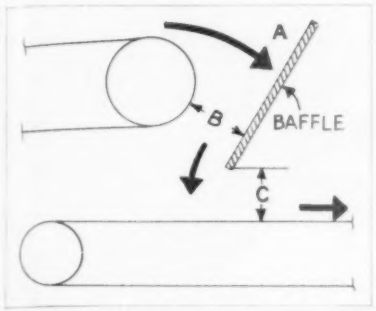
At the time of inspection all work at the quarry and crushing plant had ceased and the plant had been dismantled. However, the belt was still carrying minus 6-in. rock from the quarry storage pile to the screening plant near the damsite. When all material has been processed and stockpiled the rock processing section will be dismantled and sold. Such work is now being carried out progressively.

Stone Storage

The storage facilities tabulate as follows:

Quarry storage (minus 6 in.)	20,000 tons
Plant storage (minus 6 in.)	10,000 tons
3- to 6-in. rock	2800 tons
3- to 1½-in. rock	2400 tons
1½- to ¾-in. rock	3500 tons
¾ in. to No. 4 mesh	4000 tons
Storage ahead of sand manufacturing plant 1½ in. to No. 4 mesh	2000 tons
Finished sand	10,000 tons
Total	54,700 tons

The above tabulation does not include such items as two silos for storage of minus ¼-in. crusher-produced



Drawing showing baffle at belt transfer points; due to the speed of the belt, the rock hits the baffle at A, rather high, resulting in a build up of rock on the baffle giving impact of rock against rock. Spaces at B and C are quite large to pass the 6-in. rock

sand that can be blended into sand produced from the hammermills. This is an additional 700 tons, and there is additional storage in the bins over the three 4-cu. yd. Koehring mixers at the Johnson batching plant.

The stone is a limestone acceptable to the Corps of Engineers, U. S. Army, under whose direction the dam is being constructed. The quarry required a considerable amount of stripping the common limestone and variable amounts of soft sandstone interassociated. The face of the quarry, without strippings, was blasted down and the stone sent to the processing plant. At the crushing plant and later in the processing plant much of the siliceous material was screened out and sent to waste piles, but enough of it remained (plus the silica in the limestone itself) to give about a 12 percent silica content to the stone going to the hammermills used in the manufacture of sand. The silica content caused serious wear to the hammers, which had an average life of 40 hr. The processing was all dry and entailed the use of vibrating screens in closed circuit with hammermills. There are in use three 40-in. Cedarapids hammermills and four Pennsylvania CF9-38 impactors. In the sand section there is a battery of eight Cedarapids 4- x 12-ft. double-deck screens with ¼-in. to 16-mesh screen wire as required. Each screen is fed by an 18- x 42-in. Syntron feeder. The fines from the screens are conveyed to three 16-ft. Sturtevant mechanical air separators, belt conveyors and bucket elevators. The sand from the air separators is conveyed by belt to the storage pile and distributed over it by a shuttle conveyor. Excess fines from the Sturtevant are wasted.

The sand storage pile of 10,000 tons live capacity is unusual since two reclaiming tunnels serve it. These are not quite parallel but converge to the belt system serving the batching plant. In one of the tunnels are seven Stephens-Adamson controllable vane feeders, and in the other tunnel are six 18- x 42-in., No. F33 Syntron feeders. Both reclaiming tunnels are 108 in. dia. multi-plate steel tunnels and the gates are provided with air blast agitators.

At the outset cooling of the sand was contemplated but not used. However, the coarse aggregate is cooled through inundation in silos by circulation of ice water at 35 deg. F. Two 5- x 10-ft. double-deck Deister vibrating screens serve to dewater the aggregates and to remove fines accumulated through plant processing before being conveyed to the batching plant.

Quarry

At the quarry a 2½-cu. yd. Bucyrus-Erie 120-B shovel did the primary loading and 10-cu. yd. rear-dump Euclids, augmented by 24-cu. yd. side-dump trucks, did the hauling to the primary crusher. The primary crusher is a 42-in. Allis-Chalmers gyratory and the secondary crusher a 30-in. unit of the same make. Quarry rock could be dumped directly to the secondary crusher if desired. The two scalpers are 3-deck, 5- x 12-ft. Simplicity units, the bottom decks having ⅜-in. and ¼-in. wire cloth. Oversize from the top deck (plus 6 in.) was sent to the 30-in. crusher and the remainder to the stockpile at the quarry. Under this stockpile and serving the seven-mile, 30-in. conveyor system is a reclaiming tunnel, with five controllable gates feeding the belt. Like all others in the assembly of reclaiming tunnels, it is a 108-in. dia. multi-plate steel tube. The minus 6-in. rock in the storage pile is similarly recovered and delivered by conveyor belt to screening tower No. 1 in which are two double-deck 5- x 12-ft. Simplicity vibrating screens. These two screens have 3½-in. and 1¾-in. wire respectively, and produce the two larger sizes of unwashed rock, the 3 to 6 in. size, and the 3 to 1½ in. However, the design is such that all, or any part, of the plus 1½-in. rock can be by-passed to a 5½-ft. Symons cone crusher for further reduction. A belt conveyor conveys the crusher product and the fines to screening tower No. 2 where three products are sized. These, the 1½ to ¾ in., ¾ to No. 4 and minus ¼ in. are stockpiled separately. All or any part of the minus 1½-in. rock can be placed into another storage pile serving the hammermills. This is the raw sand surge pile. Lastly, the minus ¼-in. material can be conveyed to another waste pile,

Screening tower No. 1 contains two double-deck 5- x 12-ft. screens; at lower left is a 5½-ft. cone crusher for crushing all or a part of the plus 1½-in. material

Left: Four stockpiles of finished coarse aggregate. Right: Stone ladders, here practically buried, are used on the coarse aggregate stockpiles

Downstream face of Bull Shoals dam as it neared completion; concrete batching plant is at right along tracks

The dam while under construction last year; powerhouse in foreground will be completed in another year

or all or a part can be conveyed to two 16- x 40-ft. concrete stave silos to be blended in with the fines by means of a pan feeder (see flow diagram). Over the sand reclaiming belt there is a 24-in. Ohio magnet for removal of any accumulated tramp iron.

Dust Collectors

A noteworthy feature of the installation is the use of Roto-clone dust collectors to collect dust from the various processing units. Some of the fines wasted from the three air separators was being sold as agstone. The dust collectors consist of two batteries of two each Type "D," size 16, with air ducts 24 in. in diameter. They are both connected to a 36-in. exhaust stack. The plant has a capacity of 800 t.p.h. for all sizes.

Safety is an important subject at Bull Shoals and because of the attention paid to this important part of construction and aggregate production, fatalities have been low. To date on this $78,000,000 project there have been only two fatal accidents.

In the mass concrete at Bull Shoals the maximum permissible placing temperature is 65 deg. F., with a minimum of 40 deg. F. In the mass concrete a blend of about 25 percent Louisville natural cement is mixed with about 75 percent standard portland cement. The natural cement is of the air-entraining type and the amount of natural cement in the mix is manipulated to give a 4½ percent air content, plus or minus 1½ percent. The mass concrete is made from a 2½-bag mix which includes natural cement. Typical strengths are as follows:

2½-bag mix: 28 days—2500 p.s.i.—5 percent air—1½-in. slump
4-bag mix: 28 days—4500 p.s.i.—5 percent air—2-in. slump
5½-bag mix: 28 days—6000 p.s.i.—5 percent air—3- to 4-in. slump

Cooling of the Aggregate

Those interested in the details of cooling of aggregates are referred to a paper delivered by R. F. House at the Concrete Conference in Kansas City, Mo., on March 1-3, 1949. The paper is entitled, "The Innundation Method of Cooling Concrete Aggregates at Bull Shoals Dam." In the paper, the author describes the process, and discusses installation, operating costs and computations showing how they arrived at the theoretical cooling effects. (If copies of the paper are available they may be secured from the Department of the Army, Office of the Chief of Engineers, Washington, D. C.)

The system adopted at Bull Shoals for the coarse aggregate involves the use of eight silos each 14 ft. in diameter and 20 ft. high, set in parallel rows, with two silos being assigned to each size of aggregate. Prior to filling of a silo by the belt conveyor system the tank is half filled with water at 35 deg. F. The normal rate of placing of concrete permits about a two-hour cooling cycle with the temperature of the aggregate reduced to 36-40 deg. F., depending on size.

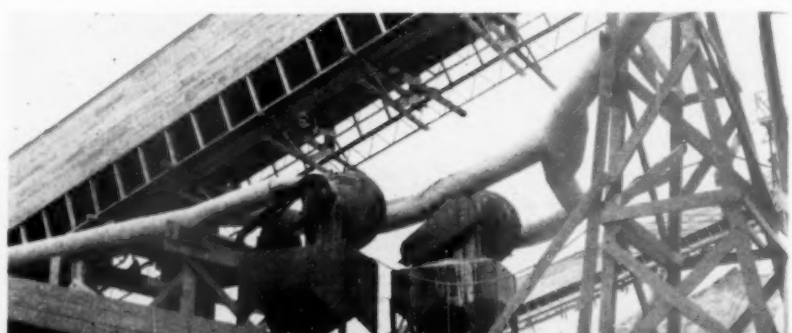
The installation for the cooling of the sand, later abandoned, consisted of a vertical type boiler or heat exchanger. Two exchangers were used and each had 327, 3-in. dia. flues, 10 ft. long. As sand flowed through the tubes, ice water cooled the tubes from the outside, after which a bucket elevator conveyed the sand to a storage bin for immediate use in concrete.

In the ice plant are three 15- x 15-in. Vilter ammonia compressors with a total available capacity of 1689 tons, at 40 p.s.i. negative pressure. Of this capacity, about 900 tons is used for the aggregate and the balance for the forced cooling of the concrete at the project. The remaining 372 tons are for air conditioning and other uses.

The ice plant cost approximately $250,000, so if salvage value of the plant is considered, the cost of cooling is said to be 9-10 cents per cu. yd.

Dam Statistics

Bull Shoals will be one of the largest concrete dams in the United States. It will be a key unit in a system of reservoir projects for control and development of White river and its tributaries. Its flood storage will benefit more than 1,000,000 acres of land. Its power units will produce enough electric power to supply a city with a population as large as that of Little Rock, Tulsa, and Springfield combined. Its waters and surrounding



Dust collectors are located at many points throughout the aggregate plant

lands will be used for fishing, boating, hunting and other forms of recreation.

Other facts related to the projects are as follows:

Dam	
Length at top	2256 ft.
Height above foundation	283 ft.
Width at base of dam	230 ft.
Width of roadway on top of dam	26 ft.
Spillway	
Length	808 ft.
Gates	
Number	17
Length	40 ft.
Height	28 ft.
Maximum flow over spillway	230,000,000 g.p.m.
Maximum flow depth over spillway	34 ft.
Flood Control Conduits	
Location	At base of spillway
Number	16
Gates in each	2
Width	4 ft.
Height	9 ft.
Operation	Gates within dam
Stilling Basin	
Length	203 ft.
Velocities with maximum discharge	
Toe of spillway	87 m.p.h.
In conduits	60 m.p.h.
At end sill of stilling basin	7 m.p.h.
Power Plant	
Penstocks	
Number	8
Diameter	18 ft.
Gates	
Width	19 ft.
Height	26 ft.
Turbines	
Number	4 initially; 8 ultimately
Diameter of wheel	13 ft.
Speed	120 r.p.m.
Capacity of each turbine at full power pool (equivalent to 80 locomotive engines)	70,000 hp.
Power output	
Average yearly	575,000,000 kw.-hr.
Materials to be used	
Concrete	2,100,000 cu.yd.
Cement	1,800,000 bbl.
Reinforcing steel	6,200,000 lb.
Other metal	10,300,000 lb.
Miscellaneous Information	
Time required for construction	5 years
Average number of employes	1500
Total man-days of work required	2,750,000

Personnel

Bull Shoals dam is being constructed by the Ozark Dam Contractors, an organization composed of the following contracting firms: Brown & Root; Peter Kewit; Morrison-Knudson; Wunderlick Construction Co.; Winston Bros.; Davis G. Gordon; Condon-Cunningham; J. C. Maguire; and Charles H. Tompkins. The Flippin Materials Co. is a separate affiliate.

Minus ¼-in. material is stored in these silos and can be fed direct to material from the hammermills

For the builders M. H. Slocum is superintendent; R. B. McRae, project engineer; Ed Shipp, concrete superintendent; Jim Quillen, electrical superintendent; Joe Jones, aggregate plant; R. Frazier, mixing plant; and Ben Clark, rigger superintendent. Pope Schoenberger is now engineer in charge of the powerhouse and formerly was in charge of aggregate production.

For the Corps of Engineers, John Kemple is engineer in charge, assisted by Lincoln Sherman. Don Basgen is construction engineer.

Cement Reaches Korean Front

AMERICAN MILITARY MEN stationed in Korea long so much for the things which remind them of home that even a sack of cement becomes glamorous in their eyes, according to a letter recently received by E. M. Barker, plant manager of Calaveras Cement Co., San Francisco, Calif. The letter was from Warren Cooper, machinist's mate, 2nd class, aboard an LST in the Pacific. It told of his excitement when a sack of cement manufactured at Calaveras Cement Co.'s San Andreas, Calif., plant, a few minutes ride from Cooper's home town, was taken aboard at Pusan, Korea.

The letter stated, "There are 75 men on my ship and every one of them knew where Calaveras county was within ten minutes of the time I spotted the label on that sack." Enclosed with the letter was a photograph of Mr. Cooper, proudly holding the sack of cement which he said was used to repair a floor on the LST.

Letter to the Editor

THE EDITOR: I would like to offer the following comment on the article by Taro Tanaka and Kunihiro Takemoto entitled "Research on Hydraulic Properties of Granulated Blast Furnace Slag" appearing in the July issue of ROCK PRODUCTS, pages 82-84.

One of two reclaiming tunnels under the finished sand storage pile is visible here

Michelsen's method of evaluating the hydraulic properties of granulated slag has been investigated by our research laboratory as a possible means of raw material selection. It was found that in addition to the lack of reproducibility, the method must assume 100 percent glass formation at granulation since it is not consistently sensitive to the presence of crystalline slag. When some crystalline slag is present the speed of $CaSO_4 \cdot 2H_2O$ formation may be relatively fast as indicated by slag "L" in Table III of Tanaka's and Takemoto's paper. Again, some of our data have shown as long as 15 minutes before any reaction takes place with crystalline slag. The presence of the non-hydraulic crystalline portion, while actually lowering the hydraulic value of the slag in most instances, can indicate, by Michelsen's test, a better than average slag. Where the exceptions to the value of crystalline material exist, as in the case of beta-calcium orthosilicate, the Michelsen method may classify a good slag as very poor.

It may be concluded that the failure of the method to discriminate between glassy and crystalline structures probably leads to the inconsistent results obtained. A more fundamental approach is needed. The work of Parker and Nurse* appears to be more realistic especially with respect to the chemical composition and the physical conditions present at granulation. The effect of these variables on the amount and stability of the glass formed constitutes the most probable source of information from which a short, reliable test method might be derived.

R. E. GALLAGHER, Chemical Engineer
Pittsburgh Coke & Chemical Co.
Green Bag Cement Division

*Parker, T. W., Nurse, R. W., Technical Paper No. 3, National Building Studies, London, 1949.

LIME PLANT MECHANIZES STONE HANDLING

Moores Lime Co., Springfield, Ohio, cuts costs of quarry haulage and eliminates bottlenecks in materials handling

By C. R. ATHERTON*

THE MOORES LIME CO. of Springfield, Ohio, has recently completed, and placed in successful operation, improved quarry facilities which should be of interest to operators of plants having a moderate production capacity.

In approaching the improvement program and abandoning the outmoded operating practices which had been used for many years, the company established for its guidance a comprehensive group of primary objectives. Chief among these was, of course, that of lowering the unit production cost. In second place was the desirability of providing a flexible installation capable of producing a wide range of stone products varying in size from shaft kiln stone to agricultural limestone. Third was the improvement of working conditions in and about the quarry to such an extent that labor problems, often perplexing to the company in the course of its history, would be relegated to a minor position. Finally, as is always the case with such improvement programs, the undertaking was to be held within reasonable limits insofar as capital outlay requirements were concerned.

In abandoning its outworn practices in favor of more modern methods, the company, under the direction of W. H. Moores, president, and his associates, developed a well balanced program in which no necessity was overlooked and no unnecessary detail provided.

As the first step in the general improvement program, the quarry floor, littered and poorly cared for as the result of long years of track haulage, was cleaned up and placed in a condition suitable for the operation of pneumatic-tired transportation equipment. At the same time, the operating face was straightened and the toe cleaned up to facilitate the simplified operation of shovel equipment and truck loading in conformity with accepted practice.

After satisfactory development of these two general programs was completed, the stone handling equipment was installed and the entire operation was placed on a mechanical basis.

Quarrying

Stripping is accomplished under contract and is done from time to time as the opportunity presents itself and general conditions are advantageous. The face, which is long and comparatively straight under present operating conditions, is drilled for blasting by means of a Loomis K-4 crawler well drill for 6-in. holes. Spacing and burden have been modified until fragmentation is very satisfactory and explosive costs are minimized. Secondary breakage is accomplished by the use of jackhammers operating on air provided by a Sullivan stationary air compressor, which is located in a compressor room adjacent to the plant office. Shovel equipment consists of two ¾-cu. yd. Lima 34 shovels each powered with General Motors 3-71 diesel engines. Transportation from the shovels to the central unloading point is provided by one Koehring Dumptor with a 4-71 G. M. diesel engine and a Ford truck equipped with hydraulic dump.

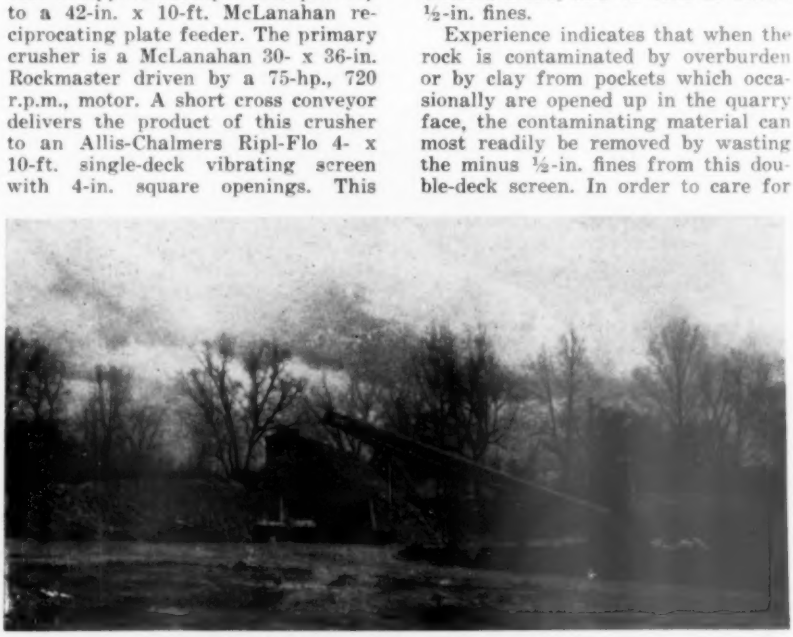
Under present operating conditions the Dumptor is capable of satisfying the entire demands of the plant and it is estimated that quarry production could be increased to approximately 450 t.p.d. without addition to existing facilities.

Stone Handling Facilities

The Dumptor delivers stone at the rate of approximately 7 tons per trip to a 42-in. x 10-ft. McLanahan reciprocating plate feeder. The primary crusher is a McLanahan 30- x 36-in. Rockmaster driven by a 75-hp., 720 r.p.m., motor. A short cross conveyor delivers the product of this crusher to an Allis-Chalmers Ripl-Flo 4- x 10-ft. single-deck vibrating screen with 4-in. square openings. This screen is a scalping screen to separate stone for the shaft kilns from material of smaller sizes. The kiln stone is conveyed by means of a 30-in. Barber-Greene conveyor to a stockpile which is so arranged that a considerable portion is kept active and may be withdrawn directly to kiln cars by means of under-cut gates equipped with Jeffrey vibrating feeders. Layout of the kiln stone stockpile and recovery tunnels may be seen by reference to the accompanying photograph. The minus 4-in. material from the scalping screen is passed to a 24-in. belt conveyor running parallel to, but in the opposite direction from, that leading to the kiln stone storage pile. It is conveyed to a 3- x 10-ft. Simplicity double-deck vibrating screen equipped with 2½-in. wire cloth on the upper deck and ½-in. cloth on the lower deck.

The three sizes of material produced by this screen are delivered into the various compartments of a three compartment bin, for car loading, truck loading, or delivery to further processing. The details of this bin are shown in another photograph. The ease with which stone of various sizes can be loaded in hopper cars and trucks is obvious. Capacity is provided for 300 tons of 2½- to 4-in. fluxing stone, 65 tons of ½- to 2½-in. crushed stone, and 65 tons of minus ½-in. fines.

Experience indicates that when the rock is contaminated by overburden or by clay from pockets which occasionally are opened up in the quarry face, the contaminating material can most readily be removed by wasting the minus ½-in. fines from this double-deck screen. In order to care for



Shaft kiln stone stockpiles and recovery tunnels

*Atherton & Evans, Annville, Penn.

Close-up of kiln stone stockpile and recovery tunnels

the occasions when this circumstance arises, and to overcome the difficulty resulting from freezing in the bin, an 18-in. x 85-ft. horizontal belt conveyor from the fines compartment of the storage bin to an outdoor stockpile has been installed. In addition, a by-pass chute is provided by means of which the fines can be diverted to the stockpile when contamination is excessive. The stockpile has a capacity equivalent to three months' production of fines and it is therefore unnecessary to move any of this material during bad weather. The advantages of this feature are self-evident.

Although the contaminated material is at present disposed of as an off-quality product at a nominal charge, means are now under consideration which will enable the owners to divert the product to more profitable outlets.

Production Controls

Complete balance of the operation is insured by the installation of two 18-in. Jeffrey vibrating feeders with solenoid converters; one on the plus 2½-in. minus 4-in. bin and one to handle the remaining two sizes. By means of these feeders, excess tonnages in any of the three sizes may be selectively withdrawn from storage, delivered to an 18-in. Jeffrey belt conveyor, and conveyed to the agricultural limestone plant, which is located approximately 150 ft. beyond the crushed stone storage bins. At the agricultural limestone plant a 36- x 30-in. Jeffrey Type A2 pulverizer with ⅜-in. grate bar spacing, driven by a 75-hp., 1200-r.p.m. direct-connected motor, receives the material from the belt conveyor and reduces it to agricultural limestone size. The output of this crusher is raised by a Jeffrey bucket elevator to a height of approximately 60 ft. where it is split over two Jeffrey 30- x 68-in. single-deck vibrating screens for sizing. The oversize is returned to the pulverizer by gravity and the fines pass to the agricultural limestone bin, whence they can be loaded either to truck or railroad car on the adjacent siding.

Simplicity and centralization of control for the entire operation are obtained by placing controls for all stone handling equipment, except those for agstone, at the primary crusher. The controls for all agstone production equipment are located at the Jeffrey pulverizer.

Additional facilities at the plant include a 40- x 60-ft. Quonset hut shop with three rooms provided on one side; plant office and laboratory, compressor building, and the usual maintenance facilities.

General view of limestone plant from quarry floor

Agricultural limestone pulverizing, storage and loading facilities

Sized stone storage and loading bins showing conveyor and waste pile for contaminated fines

Simplification of movement of all materials is provided by means of 834 ft. of railroad siding which, as can be seen from the photographs, parallels the belt conveyors and simplifies the loading problem. As may also be seen, the provisions for loading of trucks are excellent and insure speed of loading and simplicity of operation.

It is, of course, impossible to disclose the details of the cost and production experience obtained over the first several months of operation of the new facilities. However, the operators report that in a period of rising prices a reduction of approximately 30 percent in labor costs, 10 percent in power costs and 20 percent in explosives cost has been achieved since the modernization. While a part of this cost reduction may be attributed directly to increased tonnages, it is pointed out that the increase of output tonnage over the year prior to the beginning of the new operation was in the vicinity of only 10 percent.

The Moores Lime Co. is to be congratulated upon the foresight and the ingenuity with which it has carried the improvement program to completion.

Production of Cement in Greece

By ALEXANDER B. BEKIARIS

PORTLAND CEMENT WAS first manufactured in Greece in 1903, and the first rotary kiln was installed in 1912. There are now five companies operating six dry process plants, with a total capacity of approximately 400,000 metric tons annually.

As in many other European countries, the cement industry in Greece has been torn between the vital need for cement for reconstruction and the need for forcing exchange through exports. That domestic demands have prevailed is proved from the fact that 390,000 metric tons of cement were produced in 1950 and only 8000 tons were exported.

The largest manufacturer of portland cement in Greece is the General Cement Co., which produces about 60 percent of the total production. The company has offices in Athens and operates two plants, one located at Piraeus, which is eight miles from Athens and is the most important commercial harbor of Greece, and the second is at Volos in northern Greece.

Heracles Plant

When the "Heracles" plant near Piraeus was built in 1912, it had an 8- x 175-ft. rotary kiln with a capacity of 150 tons daily. In 1925, a 9- x 200-ft. kiln was added, which gave the plant a capacity of 350 tons daily.

An important expansion program is now being completed. Practically a complete, new and modern 300,000-ton per year plant has been under construction which was scheduled to begin production last month. Economic Cooperation Administration provided $1,440,000 for the purchase of equipment for the new plant.

The Heracles plant now ranks with the best, in most departments, and the plant's kiln capacity of 1300 metric tons daily makes it one of the largest plants in southern Europe.

The plant dock has facilities for unloading coal, gypsum and raw materials, and for the shipment of cement in bags to all the ports of Greece. An aerial tramway on 2000 ft. centers, with a capacity of 70 t.p.h., connects the dock crane to the storage. The pull cable travels over the storage for 500 ft., and buckets can be dumped into storage at the desired point or into the crusher hopper.

Plant of General Cement Co., here shown under construction, has two 11- x 400-ft. dry process kilns. Feed building in background and at right the homogenizing silos and 253-ft. stack

Raw Materials

Raw materials at the Heracles plant consist of high grade limestone, clay and iron ore.

The company quarries limestone about one mile northeast of the plant. A new 5050 Dixie Mogul hammermill, driven by a 350-hp. Allis-Chalmers motor, has been added to the crushing plant.

The new crusher is installed in a pit, and either end-dump trucks or side-dump trucks dump into a hopper, from which rock is fed to the crusher by a 54-in. x 18-ft. heavy-duty Stephens-Adamson apron feeder. Product from the crusher is taken by belt conveyor and dumped into the feed bins, or it is diverted to a 385 ft. centers 24-in. conveyor, which delivers the stone to any desired point over its length, by means of a hand-operated tripper. The distributing belt is located directly above the feed bins for the raw mills, so that the bins can be filled directly from the conveyor, thereby eliminating extra handling.

Covered storage for materials, which comprise the raw mill feed and the finish mill feed, is in a building measuring 700 ft. in length and 78 ft. in width, with concrete side walls 20 ft. high.

Materials in storage are rehandled and/or loaded into the several feed bins by a 10-ton P&H electric overhead traveling crane with a 4-cu. yd. Blaw-Knox bucket, which travels the length of the storage building on rails spaced 78 ft. apart.

Raw Grinding

The two F. L. Smidth 10- x 22-ft. Tirax raw grinding mills are each driven by a 1000-hp. Electric Machinery and Manufacturing Co. direct-connected synchronous motor. Crushed material is stored in eight, 150-ton bins and is fed to the two air-swept mills through eight Merrick weighing feeders and two Chain Belt belt conveyors. Syntron electric vibrators, with variable controlled power, are used to keep the bins flowing.

The mill has a slide-shoe bearing near the inlet end, with the tire mounted on the mill shell. Drying is accomplished by sweeping the mill with hot air. Usually, the moisture in the mill feed is below 5 percent, but occasionally it may go to 7 percent. An oil-fired furnace supplies heated air to the mill.

The heated air sweeping through the mill carries the ground particles out of the mill, as they are produced, to a Smidth separator. The finished product as classified is then put through a cyclone, where the material is precipitated. Part of the air is drawn through a Sly dust filter by a secondary fan driven by a 30-hp., 735 r.p.m. motor. The main circulating fan is driven by a 300-hp. General Electric motor, direct-connected through a Falk flexible coupling.

The finished ground raw mix is transported by a 10-in. Fuller-Kinyon pump to the homogenizing silos, which are one of the most interesting features of the plant.

Basic design of the mill departments provides for ready access to

The Author

Alexander Basil Bekiaris, manager of the Heracles plant of General Cement Co., was born in 1895 in Tyrnavos, Thessaly, Greece. He was educated at the Military Cadet School and came out as sublieutenant of the Military Corps of Engineers in 1914.

Since his resignation from the army in 1917 he has been with the General Cement Co. of which his father was one of the founders.

Mr. Bekiaris has traveled widely in Italy, Germany, Belgium, Denmark, Switzerland, France, Luxembourg, England and the U. S. in order to visit cement plants and cement mill machinery manufacturers.

Under the general management and directives of A. N. Hadjikyriacos, Mr. Bekiaris is largely responsible for the expansion and modernization of the Heracles plant.

equipment to facilitate maintenance and for easy handling of materials. There is ample spaciousness which contributes to favorable and safe working conditions. An overhead, hand-operated crane of 10 ton capacity has free travel over each mill for handling grinding media, liners, bearing caps, etc. Mill buildings are of concrete and steel construction. The raw grinding capacity of the new grinding department is sufficient for operation of both the old kilns and the new kilns and the total plant capacity will be approximately 2,500,000 bbl. of cement per year.

New Dry Process Kilns

Among the principal features of the plant are the two dry process kilns. These kilns measure 11 x 400 ft. and are the longest dry process kilns in the world. They were designed by F. L. Smidth & Co., New York, N. Y., and are expected to produce about 2500 bbl. of clinker per day, each with a fuel consumption of approximately 850,000 B.t.u. per bbl.

Each kiln rides on five tires, has a slope of 7/16 in. to the foot and is rotated by a 125-hp. G-E motor, with a speed range of 300-1000 r.p.m., through a Falk gear-reducer unit. The drive is synchronous with the rate of feed into the kiln by screw conveyor.

For stand-by, in the event of electrical power failure, there is a Hercules gas engine for each kiln to permit rotating the kiln slowly.

The kilns are oil-fired and the oil-firing equipment is designed to operate on Bunker C fuel oil, which is introduced at 300 p.s.i. and burned at 220-250 deg. F. using a Schutte-Koerting oil burner. Two De Laval "Imo" pumps, one as a spare, are available.

Each kiln discharges clinker over a 6- x 29-ft. Fuller inclined grate cooler with automatic bed level control and Reeves speed control. New York Blower Co. fans, supplying the cooling air, have a capacity of 35,000 c.f.m. each, at 5-in. w.g. static pressure at 70 deg. F. Each fan is driven by a 40-hp. motor through a Falk flexible coupling.

The clinker is delivered to a Miag Skipulter that carries it to a bucket elevator, which fills a storage pile in the clinker storage by means of a drag chain.

The kiln lining is of 6-in. brick throughout. In the burning zone, the refractories are 70 percent alumina, and the remainder are 40-42 percent alumina. No insulation is used.

The central control station for each kiln will include oxygen analyzers, temperature and speed recorders, automatic bed speed control for the Fuller cooler and Foxboro throttling potentiometer controllers.

The kiln feeder consists of two parallel screw conveyors, the one superimposed over the other. The upper screw is equipped with a surge box and an overflow level, thereby insuring a constant head feed to the lower screw, which discharges the feed into the kiln. The speed of the lower screw is synchronized with the speed of the kiln motor by means of a 15-kv.-a. Ideal Electric sending unit.

Each of the kilns has an individual Type FL, S 52 Buffalo draft fan driven by a 250-hp., 750-r.p.m. motor through V-belt. Each of the fans is designed to handle 125,000 c.f.m. at 3¾-in. w. g. static pressure at 650 deg. F.

Each kiln exhausts through a Buell dust collector, consisting of 12 cyclones arranged in two groups of six each.

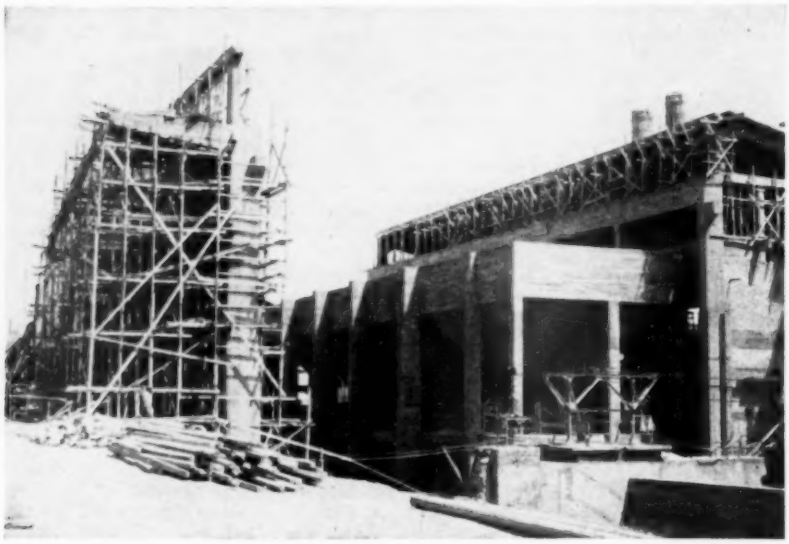
When required, cooling air may be introduced at the back ends of the kilns in order to protect the induced draft fans against overheating. The temperature is lowered through the blending of air in the dust chamber by means of a Foxboro valvactor with automatic proportional-temperature controllers.

The louvre dampers in the ducts, between the dust cyclones and the fans, are arranged for remote operation from the kiln control panel on the burner's platform. The motorized speed-reducer for each damper is equipped with a hand-wheel to permit hand operation of the damper in case of emergency.

The dust is returned continuously through an elevator to a point over the feed end of the kiln, where it discharges into a small bin. A screw conveyor transports the dust directly into the Duraloy feed pipe.

A common reinforced concrete chimney was designed and built by Greek designers and builders of industrial chimneys. In constructing the shaft, the contractor used adjustable steel chimney forms with a hanging derrick and working platforms. The specifica-

Left: The two new 11- x 400-ft. kilns looking down from the feed building. Existing plant, packhouse and cement silos in background. Right: Mill department; the two mills in background are 10- x 22-ft. raw grinding mills, and the one in foreground is a 7½- x 40-ft. three-compartment tube mill for finish grinding



Raw mill storage building and silos under construction

tions called for the chimney shaft to be designed in accordance with specifications 505-36 T of the American Concrete Institute, entitled "Tentative Specification for the Design and Construction of Reinforced Concrete Chimneys," which has been the basis for the design of practically all large reinforced concrete chimneys built in North America during the past 20 years.

The height of the chimney above ground level is 253 ft. and the internal diameter of the concrete shell is 17 ft. at the top. The chimney is lined over its full height with a self-supporting brick lining.

Blending through Aeration

Accurate mixing and thorough blending were the objectives in the decision to build six blending silos with Bin-Dicator automatic level controls, two of which are aeration silos. The size of the blending silos is based on each having the capacity of the two homogenizing tanks.

The finished ground raw mix is conveyed by a 10-in. F-K pump to the four previously mentioned blending silos. The material is de-aerated through a cyclone on top of the four-spout distributor.

By means of pneumatic feeders for draw-off, a screw conveyor and an 86-ft. centers bucket elevator, the material is transported to one of the two aeration tanks. Each is equipped with a stirring device to permit thorough blending. Samples can be taken in four different places from each silo as a means to insure a uniform feed material for the kilns.

When the raw material in an aeration silo has been mixed and the silo is ready to be drawn from, pneumatic draw-offs and a bucket elevator transport the material to a kiln feed storage silo of 12,000 bbl. capacity.

Finish Grinding

The finish grinding department consists of a 7½- x 40-ft. Miag three-compartment tube mill, driven by a 750-hp. A.E.G. motor, and in addition, a 9½- x 10-ft. ball mill ahead of an 8- x 40-ft. Smidth two-compartment finish mill. The grinding capacity since installation of the ball mill and two-compartment finish mill has been increased to 8000 bbl. per day, which is the largest in Greece.

The ball mill is driven by a 500-hp. Electric Machinery and Manufacturing Co. direct-connected synchronous motor. The finish mill is driven by a 1000-hp. direct-connected synchronous motor of the same make. Proportioning of clinker, gypsum and pozzolana is done by Merrick Feedoweights.

The ball mill output is finish mill feed, and the finish mill is in closed circuit with a 16-ft. Sturtevant mechanical air separator. The mill design is flexible so that alternate circuits would easily permit rejects to be routed to the 7½- x 40-ft. Miag tube mill or any portion be directed to either of the tube mills. A graded final production is the objective without considerable deficiency in small micron sizes, which some experts claim are desirable.

The finished cement will be transported by an 8-in. Fuller pump to the 12 cement silos of 60,000-bbl. total capacity.

The three-compartment Miag clinker mill may be operated separately, and then the finished product can be transported to the cement storage silos through screw conveyors and elevators. St. Regis packers are used to load the 50-kg. (112-lb.) sacks, which is the size commonly used in Europe.

One of the principal objectives of the company was to increase its finish grind and clinker storage section so that, if business falls off, raw production can easily be reduced and clinker grinding carried out on day schedules that would fit into the sales volume.

Power—Instrumentation—Laboratory

The power distribution station, which is pressurized and thereby kept dust-free, is located close to the grinding department, thus economizing through use of low voltage cables.

Electric power is purchased from the local power company. Incoming electrical energy is stepped down from 6600 volts to 2400 volts by two 3000-kv.-a. Allis-Chalmers transformers.

Through four other transformers, electricity is fed to two unit load centers, at strategic points in the plant, for step down to 500 volts, which is the potential for all electrical equipment, except the large synchronous motors which operate at 2300 volts.

A completely equipped laboratory is the means of control over the manufacturing process, from the time the raw material arrives until the finished product is pumped into the cement silos. The Heracles plant produces six types of cement, which include standard portland, modified portland and high-early portland. The products will meet the specifications of any other country, including the United States.

Personnel

Official personnel includes: A. Hadjikyriacos, president, who has been the guiding spirit in the development and implementation of the various phases of plant improvement, modernization, and expansion; A. Tsatsos, managing director; A. Bekiaris, plant manager of the Heracles plant; A. Demetriadis, manager of the Olympos plant; T. Bizakis and A. Pappas, chief chemists; and A. Vroulis and C. Emmanuel, chief engineers.

Olympos Plant

In 1928, General Cement Co. purchased the Olympos plant, located at Volos. This is a dry process waste-heat plant, with an 8½- x 136-ft. kiln, designed by Miag.

The company completed a number of improvements to this plant before the war. The most important were the installation of a new crushing plant, ten blending silos with a total capacity of 12,000 bbl. and a new turbine generator of 2500 hp.

At the end of 1950, orders were placed in the United States for a new 11- x 400-ft. kiln, one 10- x 22-ft. air-swept raw grinding mill, one clinker mill, a Fuller inclined-grate clinker cooler, pumps, Merrick weighing feeders, etc., of the same capacity as the Heracles plant units.

A new Combustion Engineering Co.

(Continued on page 106)

At the height of the Kansas City flood, the two cities looked like this. View is looking northeast at the Missouri river on the right and the Kansas (Kaw) river confluence at the bridge in center

Activities of Producers During Kansas Floods

Aggregates and concrete plants inundated. Many contributed to flood protection and rehabilitation work following worst flood in history

By TIP BROWN

JUST BEFORE THE MIDDLE of July, word flashed over the country that the rich river valleys of Kansas were being buried under the most devastating flood in the history of the country and that the overburdened Kaw (Kansas) river was hurling an avalanche of water eastward toward the Missouri river at Kansas City. The 1903 flood which had been remembered as the worst for almost half a century was eclipsed in every respect by the 1951 flood.

Heavy inundations at Salina, Manhattan, Junction City, Topeka, Lawrence, Ottawa and other Kansas cities preceded further losses in the twin Kansas Cities where the Kaw meets the Missouri river. The physical damage in Kansas, Missouri, and a small section of Oklahoma has been estimated at well over a billion dollars. Forty-one persons have been reported dead. Thousands of homeless people are being housed temporarily in public shelters.

Construction Industry Mobilized for Relief

Agencies of every character performed yeoman services in bringing relief to suffering humanity and to the restoration of property. For this record, we are concerned with the part played by those companies linked with the rock and concrete products industries of the area.

In the Kansas Cities, the construction industry sprang into the relief picture with two organizations designed to assume responsibility for the clean-up as quickly as the water had subsided to a point where management, labor, and massive equipment could be put to work. In Missouri, the organization was named Disaster Corps, Inc., and on the Kansas side, Relief Rehabilitation Corp. Joint officers served the two groups as follows: Robert W. Long (Long Construction Co.) president; Perrin D. McElroy (manager, Building and Construction Trades Council) vice-president; W. W. Hutton (secretary-manager, Builders Association) treasurer; James E. Burke (secretary, Heavy Constructors Association) secretary. Serving as directors with these officers on the Disaster Corps, Inc., were H. J. Massman, Sr. (Massman Construction Co.) and A. R. Waters (Carter-Waters Corp.). Serving with the officers as directors of Relief Rehabilitation Corp. were Guy E. Brown (Brown Construction Co.) and Wells Haren (Haren-Laughlin Construction Co.).

The method of operation provided that labor should provide all needed workers at $1.50 per hour regardless of classification except as otherwise required by law; management should furnish executive and supervisory personnel free and equipment at one half the normal rental rate. The work of the organization was to be completed in one week and encompassed the following set jobs:

(1) Opening up main thoroughfares to rough traffic in the affected districts.
(2) Opening up and keeping open sewer catch basins, a severe problem in view of the constant dumping of debris from private properties into streets.
(3) Pulling of motors, generators and transformers from three sewage pumping plants and transporting them to repair shops.
(4) Towing 300 stalled passenger automobiles from the area to new parking lot in Kansas City, Mo., for owners to reclaim.
(5) Supplying men and equipment to the Red Cross for emergency campaign to eradicate rodents.
(6) Hauling 7000 dead animals out of area for burial.
(7) Miscellaneous emergencies of temporary road building, digging drainage outlets, opening dikes, and aiding Fire Departments with special equipment for clean-up work.

The commitments were completed on schedule with 1000 men employed and a massing of heavy equipment such as had not been previously witnessed on such a scale. Funds for operations were supplied by the Army Corps of Engineers from federal appropriations for the purpose.

Quarry Industry Takes a Hand

Gradually, the public is learning of the vast cooperative efforts of government, industry, labor, and private individuals in the area of the two Kansas Cities where the volume of loss was particularly heavy because of topography and the concentration of industry and population. At this point the swollen Kaw river heads in a northerly direction and empties into the Missouri, which flowing southward makes a big bend and turns to the east on its way to the Mississippi near St. Louis. Much of the force of the combined Missouri and Kaw rivers

was directed toward the sand and dirt dike protecting the major part of the $10,000,000 Municipal Airport, as well as the adjoining industrial and residential area of North Kansas City in Clay county, Mo.

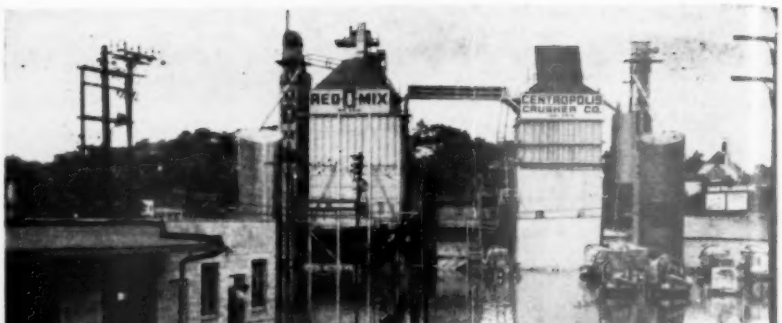
Near noon time on the fatal Friday, July 13, aviation and municipal authorities of Kansas City, Mo., realized that only by the most extreme measures could major losses be averted. Bulk of every description including automobile bodies, sand bags and riprap by the thousands of tons was dumped over the river side of the dike, only to disappear into the flood and with faint hope that the bulk would take hold.

The limestone industry was immediately called upon and gave priority to the needs of the city and the Army Engineers. Setting aside every other activity, quarries for miles around responded with energy and willingness to aid.

As one example, the Midwest Pre-Cote Co. was called upon to supply rock for the emergency from its limestone quarry at Randolph, Mo., in Clay county, six miles east of North Kansas City. A multitude of responsibilities descended upon Gordon B. Morris, superintendent of the plant. Within two hours after request for help was received, riprap from an open quarry was made available. Seventy-eight trucks were soon in service moving this rock to the airport. They remained at work continuously, night and day, until the danger was past. More than 26,000 tons of rock were loaded out within a ten day period. Eventually, enough of the 10,000 tons of riprap and other bulk stuck to the underwater sides of the dike along the airport and saved it.

Downstream, below Kansas City, the Missouri was eating into the river banks on the north and carrying away the carefully laid bank protection. The Wabash and Burlington railroads enter Kansas City from the east by way of the north bank of the river and at one spot some ten miles downstream, the loss of much track appeared imminent. Midwest Pre-Cote Co., from the quarry at nearby Randolph, built a roadway across an open field and dumped 7000 tons of heavy rock into the damaged dike until further encroachment of the river was halted.

A few miles still further downstream, the river washed out the dikes protecting the north pier of the $2,250,000 Harry S. Truman railroad bridge which was without wingwall protection. The water threatened to cut in behind the abutment and weaken it to the extent that a collapse of the north section of the heavy steel structure might be expected. Heavy rail traffic of the Rock Island and Milwaukee lines was at stake and again more than 10,000 tons of rock from the Midwest Pre-Cote quarry was dumped into the area. The damage was stopped and the dike approaches to the bridge were later replaced with new piling and more tons of rock hauled to the spot on giant steel barges. The river equipment of Massman Construction Co. was available for this purpose and the rock pushed into the river from the deck of the barge by a bulldozer.



Another plant inundated was Centropolis Crusher Co. office and its affiliated Ready Mixed Concrete Co. plant, under 14 ft. of water

Another story of effective cooperation of the rock products industry is credited to the Centropolis Crusher Co., which operates a large quarry in the eastern section of Kansas City, Mo., out of the flooded area.

Word was sent to the quarry superintendent, Harold Miller, to turn the plant into a relief station and immediately operations went around the clock for an emergency period of ten days. Getting new men proved impossible under the circumstances so the regular force doubled by working from 14 to 18 hr. a day. Superintendent Miller got a few hours rest in a chair and the dispatcher at the plant who handled all of the delivery tickets, E. H. Piper, worked for a straight 22 hr. Loads of heavy rock left the plant for the danger spots at the Municipal Airport, and emergency protection of the intake and outlet pipes at the new Hawthorne pumping plant on the Missouri river owned by the Kansas City Power & Light Co. The railroads were desperate for help in holding steel bridges in the flooded area from slipping from their piers. Gondolas and air dump rail equipment were loaded to maximum capacity at the Centropolis quarry and hastily dispatched to the Kansas City Southern, Missouri Pacific, Milwaukee and Kansas City Terminal railroads. The record supports the value of this endeavor as all bridges held well and even the oldest withstood the heavy pressure of surging waters and the immense quantities of debris that lodged against the bridge structures.

Peerless Quarries Under Water

Peerless Quarries, Inc., at Turner, Kan., located on the Santa Fe railroad about ten miles west of downtown Kansas City and but a scant half mile from the rampaging Kaw river, had 20 ft. of water over its plant office and over the primary and secondary crushers. Some 35 acres of underground quarry were flooded, but were completely pumped out within 30 days. Little was lost in mechanical equipment as motors were removed in advance and most damage came from mud and silt on equipment and stockpiles of finished material. The flood cost the company about 30 days of operating time.

Thompson Crushed Rock Co. Battled Water

Thompson Crushed Rock Co., another major rock producer in the Turner, Kan., area, reported 14 ft. of water after all personnel of the company had waged a 36-hr. battle preceding the flood to prevent damage. Some of the effort was lost when the dike broke north and south of the plant in two places. It had been impossible to move the largest motors, and after the deluge, crews went into the plant in boats, floated them out on rafts and were able to get them repaired and back into place within a week. Trouble came from working wet rock after the mine was drained and combatting the foot of mud and silt that had settled on the floors. The company resumed about 50 percent operation within a little over three weeks and was back on full production in six weeks. It was given local recognition in the press for having been first among the industries in the locality to get back in production. Prior to being flooded, the plant had furnished some 5000 tons of rock for protection of a main highway bridge a few miles from the plant.

Sand Industry Had Temporary Setback

A string of sand plants extends along the Kaw river from a few miles west of Kansas City, Kan., to Law-

rence, Topeka, and Manhattan, Kan. The largest concentration of plants is in the Kansas City area and sharp, well graded Kaw River sand has been in demand for many years. The Santa Fe railroad serves plants on the south side of the Kaw river and the Union Pacific and Rock Island railroads on the north bank of the river. Seven plants are concentrated in the area of Turner and Muncie, Kan., in the Greater Kansas City territory. Production averages 1000 t.p.d. for each plant in normal times. Four are electrically operated and three are diesel operated. Five ship by rail and two by truck. None escaped flooding and all lost their current stockpiles. Floating equipment came through in much better shape than might have been expected. Mechanical equipment was rapidly restored. Three of the plants were back in production early in August. Nearly all plants were flooded up to the 25 ft. level, which exceeded by 5-6 ft. the disastrous flood of 1903.

Cement Industry Escapes Heavy Losses

With the exception of the plant of Lehigh Portland Cement Co. at Iola, Kan., damage to cement plants was negligible but shipments suffered during the time that transportation was unable to move. This was of comparatively short duration, and flexibility of freight movement was utilized to keep traffic moving. According to reports, the Iola plant had some 3 ft. of water in the packhouse and other departments from overflow of a creek near the plant. Some 20 ft or more water filled the limestone quarry adjoining the plant. Packing and shipping operations were crippled for a period of some three weeks and manufacturing operations were delayed slightly longer.

Concrete Material, Inc., Kansas City, Kan., operates 22 ready-mixed concrete trucks from 3-6 cu. yd. capacity and eight dump trucks. Its principal business is ready-mixed concrete but it also handles crushed stone from its quarry at Loring, Kan., a station on the Union Pacific railroad 3½ miles west of Bonner Springs. The quarry was flooded but damage was of a minor nature. The ready-mixed concrete plant was directly in the path of the flood and water reached a depth of 10 ft. there. All equipment possible was moved to higher ground, but of six trucks caught in the flood, only three were recovered. The plant lost production for approximately three weeks. Guy Stanley Jr. is president, Norman Fordyce is vice-president and Robert C. Brown is plant superintendent.

Tru-Crete Products Co., Kansas City, Kan., suffered a total loss of plant and equipment in the flood waters which spread over the Argentine district. At 5:20 p.m. on Friday, July 13, when the dikes could no longer stand the terrific pressure of the uncontrolled Kaw river, water poured in. By early the next day, water in the plant was 15½ ft. deep. The break in the dike was not more than 150 ft. from the plant. A complete rehabilitation program had been underway for some time. A new boiler had been in use only three days. Two twin Hydro Korpak concrete block machines with a capacity of 3500 block daily had been operating for a month on a 25 to 40 percent basis. New kilns had been built and new racks installed. Left standing today are the first two courses of the concrete block building, 60 x 120 ft., which housed the plant. President Truman Hendricks says an accurate accounting of loss will not be possible until clean-up work has reached an advanced stage. Of his investment of around $175,000, seven trucks were saved and there may be salvage of from $7-10,000 on machinery.

Eternacrete Products, Inc., Kansas City, Kan., one of the larger block plants of the area, is located in the Fairfax district. The district appeared to have an excellent chance to escape the fate of some of the other industrial sections, but again the dikes proved inadequate and the water came rolling in. Water in the Eternacrete plant reached 5 ft. and 6 ft. in the office. Advance precautions greatly reduced what would otherwise have been extensive damage. L. L. "Mike" Daugherty is manager of the company.

Massey Concrete Products Co., which has a branch plant in the heart of the Armourdale industrial district of Kansas City, Kan., was in the direct path of the flood and reported a total loss of buildings. Rehabilitation work is under way to get into production as fast as conditions will permit.

Lock Joint Pipe Co., has two plants at Turner, Kan., on the Kaw river some ten miles west of downtown Kansas City, Mo. One plant, engaged in making high pressure concrete pipe, met with considerable losses from buildings being washed away and from lost time in waiting for electric motors and other mechanical equipment to be repaired. The second plant, which was on adjoining property, met with somewhat similar losses in buildings and forms. It was engaged in making pipe for the new Hawthorne plant of the Kansas City Power & Light Co., as well as for some municipal contracts.

M. N. Penny, Lawrence, Kan., had 12-15 ft. of water in his Lawrence block and ready-mixed concrete plant. Damage to machinery and loss of several cars of rock, sand and cement was estimated in the neighborhood of $15,000. The ready-mixed concrete plant which he operates at Emporia, Kan., was not touched by the flood.

Salina Concrete Products, Inc., Salina, Kan., reported 4 ft. of water in the plant and losses far below those suffered at points further down the river. Most electric motors were removed but rewiring of the plant will be necessary. As water was back-up and not current, no silt was encountered. Some staining of block occurred where water stood for a long period of time.

Concrete Materials, Inc., Kansas City, Kan., moved its ready-mixed concrete trucks on top of the stone stockpiles when water covered the plant

Lawrence Portland Cement

LAWRENCE PORTLAND CEMENT CO., New York, N. Y., recently reported that its sales of cement for the first quarter, ending March 31, 1951, were 50 percent higher than for the corresponding period of the previous year, largely due to unusually high construction during months when building is ordinarily slack. Despite cutbacks in housing, cement requirements in defense and heavy construction are expected to reach or pass last year's record figures, especially in the Pennsylvania and New England areas where the company's two plants are located.

The company's Thomaston, Maine, plant, the only cement plant in New England, is being expanded from its present 1,200,000 bbl. of cement annually to 1,800,000 bbl. However, due to some material shortages, the extra production may not be available until 1952.

The Northampton, Penn., plant has a capacity of 2,200,000 bbl. of cement annually, but this capacity is to be *decreased* to 1,800,000 bbl. because of an agreement to discontinue operation of seven outmoded kilns which are causing "dust conditions" in the community.

Fig. 1: Gravel and water being delivered into hopper on board the dredge

English producer of gravel operates suction dredge that also delivers product to land plant

SELF-PROPELLED SUCTION DREDGE

A NEW TYPE OF self-propelled suction dredge for excavating gravel from wet pits has recently been completed by Brooke Marine Limited, Oulton Broad, Lowestoft, Suffolk, England. The vessel was constructed to the order of Dow-Mac (Quarries), Limited, Tallington, Stamford, Lincolnshire, a novel feature of the design being that only one prime mover is needed to perform the operations of dredging, discharging and propelling the vessel. Photographs of the dredge in operation are reproduced in Fig. 1, which shows the gravel and water being delivered into the hopper, and in Fig. 2, showing the dredge prepared for discharging the gravel aggregate ashore. The vessel was prefabricated in welded units at the builder's yard, each unit being of a suitable size and weight for transport by road to the quarry. There were eight such units, none of which exceeded a weight of 5 tons; these were riveted together at the side of the quarry and the completed vessel launched into Tallington excavation.

Drawings showing elevation and plan views are reproduced in Fig. 3. The hull is of box form, divided into four compartments by watertight bulkheads; it has scow ends and the hopper is of inverted pyramid shape. The length overall is 82 ft., the width, 23 ft., the depth, 11 ft. 6 in., and the draft, loaded, approximately 9 ft. The frames are constructed from 3- x 2½- x ¼-in. angles and the chines from 3- x 3- x ⅜-in. angles. The shell plates are 5/16 in. thick and the deck plating ¼ in. thick, while the hopper is constructed from mild steel plate having a thickness of ½ in. The hopper is designed to carry a maximum of 130 cu. yd. of gravel, weighing 3800 lb. per cu. yd. as excavated. When in operation, the dredge is capable of filling and discharging the hopper six times in a 24-hr. day; the total output, therefore, is in the neighborhood of 1320 tons or 780 cu. yd. a day, the actual output depending, of course, on the length of run between the points of loading and discharging. The gravel is drawn from the bottom of the pit through the suction pipe by means of a centrifugal pump and is discharged into the hopper, the pipe being adjustable to provide for various depths. When loaded, the dredge proceeds under its own power to the discharging quay, where the delivery pipe is coupled to the shore connection and, after operation of the change-over valves, the pump draws the gravel from the bottom of the hopper and discharges it through a rising main to the gravel screens erected at the side of the pit.

Reprinted from Engineering, Great Britain.

Construction Details

The main engine is a General Motors Series 71 6-cyl. diesel unit of the automobile type, but with the gearbox removed, the output of the engine being limited to 100 b.hp. at 1000 r.p.m. Radiator cooling is employed, a vent trunk leading from the deck to the front of the radiator. A single dry-plate clutch of the over-center cam-engagement type forms an integral part of the engine, the splines in the clutch-output plate engaging with a stub shaft supported in ball bearings and fitted at the free end with a loose-half coupling. This shaft, in turn, is connected to a mild-steel pulley shaft which carries the clutches and pulley wheels for the gravel and flushing pumps. The end of the shaft remote from the engine is connected to a Parsons marine-type gearbox provided with ahead, neutral and astern positions, the gearbox, in turn, transmitting the drive to the propeller shaft, which is supported in lignum-vitae bushings. The propeller is of the conventional three-bladed type; it is made from bronze and is designed for an input of 75 shaft horsepower at 1000 r.p.m. and to give the vessel a speed, when loaded, of not more than 4 knots.

The main gravel pump was supplied by Gwynnes Pumps, Limited, Hammersmith, London. It is an 8-in. centrifugal unit of the single-inlet type, having an output of approximately 140 tons of solid material an hour at a speed of 560 r.p.m. It is driven from the pulley shaft through a dog clutch and six link-type V-belts, the power absorbed by the pump at the rating quoted being approximately 65 hp. Flushing and priming water for the main pump is delivered by a separate 2-in. centrifugal pump. This also was supplied by Gwynnes Pumps, and, like the main pump, is driven from the pulley shaft by link-type V-belts. It is capable of delivering 100 gal. of water per min. against a total head of 100 ft. when running at 1855 r.p.m., the power absorbed at this rating being approximately 6 b.hp. The main-pump suction can be connected either to the main suction pipe, which draws the gravel from the pit or to the base of the hopper, suitable sluice-type change-over valves being provided for this purpose. The main suction pipe is fitted with a dredging mouth at the lower end and a special trunnion mounting at the top end, where it passes into the hull.

the dredging mouth being lowered to the required depth by means of a hand winch. This arrangement can be seen in the drawing (Fig. 3).

The main pump can be arranged to discharge either into the hopper or a shore line, a ball-type revolving point and a quick-rotating flange-type coupling being fitted to enable a rapid change-over to be made. The flushing pump discharges to the main-pump glands and casing, and the main-pump thrust block, and suitable connections are provided so that it can be connected to the vessel's bilge system, the discharge in this case being overboard. Hand-operated bilge pumps, however, are fitted in each watertight compartment, the bottom of the hull being arranged so that wells are formed at each suction position. Electric power for the floodlights, deck lights and general services is provided by a separate generating set installed in the engine room. The set, which was supplied by Auto Diesels, Limited, Uxbridge, Middlesex, operates at 220 volts and is driven by a single-cylinder diesel engine, the maximum output being 8 kw. The machinery casing is provided with a removable top so that the main engine, pumps, etc., can be removed for overhaul as complete units. Hand-operated steering gear is provided, comprising a pedestal and wheel connected to a semi-balanced type rudder by chains and sheave blocks. Other equipment installed on the vessel includes two hand-operated combined mooring and anchor capstans, two 200-lb. Danforth anchors, each with 50 fathoms of ⅝-in. short-link cable, six cast-iron mooring bollards and the winch for raising and lowering the suction pipe.

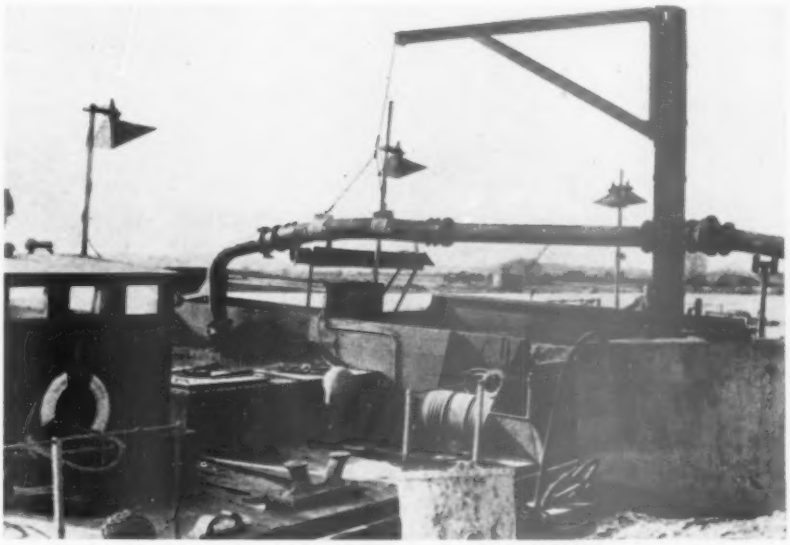


Fig. 2: Dredge equipment prepared for discharging gravel to shore hoppers

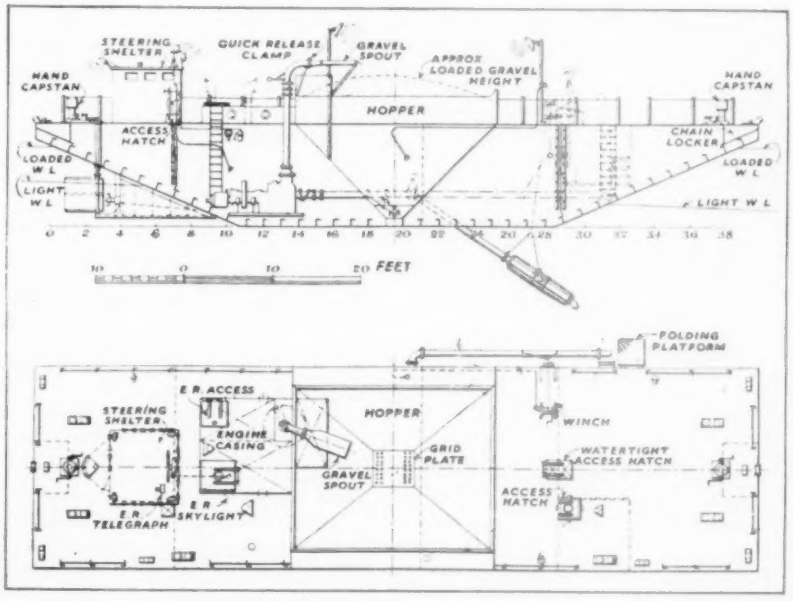


Fig. 3: Drawings showing plan and elevation of the suction dredge

Gypsum Safety Awards

THE GYPSUM ASSOCIATION recently announced that accidents in the operating plants of the gypsum industry have been reduced approximately 50 percent in the last eight years. The accident reduction was attributed to the industry's intensive safety program.

Winners in the 1950 safety contests conducted in 50 gypsum-producing plants have been announced as follows:

Class A—400,000 man-hours and over: The Certain-teed Products Corp. plant, Fort Dodge, Iowa.

Class B—200,000 to 400,000 man-hours: National Gypsum Co.'s plant, Medicine Lodge, Kan.

(No Class C competition)

Class D—less than 100,000 man-hours: Ideal Cement Co. plant.

United States Gypsum Co. also had an accident-free record in its Class A plant at Norfolk, Va., but won second honors because fewer man-hours were worked. The same company also attained accident-free records at its Class D plants in Milwaukee and Cleveland, but again had fewer man-hours worked than the winning plant.

The total number of man-hours worked by the 50 participating plants was 25,125,865.75. Number of accidents totaled 332, with the accident-frequency rate being 13.21 per 1,000,000 man-hours worked. The national average for all industry last year was about 15.

The gypsum industry's safety program includes plant meetings on safety, visual aids, a safety bulletin which is published six times a year, and slide films. Members of the industry's 1950 safety committee were: M.C.M. Pollard, National Gypsum Co., chairman; George Ware of Celotex; O. F. Greeve of Certain-teed; Webb Carlfield of Kaiser Gypsum; Don Powell, U. S. Gypsum Co., A. M. Turner, Pabco Products, Inc.; and James Bale, Grand Rapids Plaster Co.

Railroad Ballast Plant

MORRISON-KNUDSEN CO.'S railroad ballast plant at Granite Canon, Wyo., recently resumed its seasonal granite crushing operations and will continue operations until late next fall to provide ballast for the Union Pacific Railroad. Plant capacity is about 4000 tons of granite ballast per day. The company's crushing plant lies adjacent to the main line of the Union Pacific. The railroad is loading ballast at the rate of 130 cars per day, for ballast work on the U.P.'s Wyoming and Nebraska divisions.

General view of Lehigh Materials Co. lightweight aggregate plant; at left is office and at right is the sintering plant. Screening plant is in center

Processing Tailings Into Lightweight Aggregates

Lehigh Materials Co. plant, Lansford, Penn., employs endless grate type of furnace to expand sized material

By WALTER B. LENHART

SEVERAL YEARS AGO when we first heard of a new lightweight aggregate that was being made "... by some coal company in Pennsylvania . . .," we visualized at the time another culm pile catching on fire spontaneously and producing some more of the so-called "Red Dog," a lightweight material, usually red to brown in color and often of dubious value. One finds this material in use as an aggregate in some sections of the coal mining areas. We had heard of such piles burning before, and pictured an enterprise of rapidly diminishing assets, for once the material is sold it is not easily replaced. In fact when the pile is sold, the business ends.

In view of the growing interest in lightweight aggregates, we decided to see for ourselves. An exceptionally large modern plant was found that has the earmarks of tip-top engineering skill behind it, producing a shale-type lightweight aggregate with selected mine shale as the raw material. The main features of the plant are two large buildings, one mainly of steel construction and the other of concrete masonry units and steel. They comprise the Lelite Plant of Lehigh Materials Co., an affiliate of Lehigh Navigation Coal Co. Inc., Lansford, Penn. Instead of a cooling pile of burned culm, there is here an expertly designed and up-to-the-minute lightweight aggregate plant. It is situated in the Panther Valley, just east of Tamaqua, about five miles west of Lansford. Its importance to the concrete industry as a whole is emphasized by the fact that within a radius of around 225 miles of this plant live some 35,000,000 people, or roughly 25 percent of the entire population of the United States. And in this same area no natural lightweight materials are available. Also, with hard fuel users rapidly turning to powdered coal, liquid, and/or gaseous fuels, the future supply of cinders is questionable. The plant is located on a highly integrated railroad system serving the coal mines so a wide area can be serviced easily.

The first question a concrete man asks about this new operation is not about the technique of manufacture but about the material itself. To more easily answer this question the writer must go back a few years to establish some basis for making a statement, favorable or unfavorable. The writer is well into the fifth year of continuous travel for ROCK PRODUCTS and CONCRETE PRODUCTS during which time a large number of concrete masonry buildings have been inspected—motels, hotels, private dwellings. When he sees a three and one-half story building that looks almost as big as half a city block, and that building made of Lelite concrete block with not a flaw or crack on it, the question automatically answers itself. The building is made of Lelite block and crammed full of heavy machinery plus three large furnaces that could set up not only vibrations but unequal temperatures within the structure itself. Yet there were no flaws. We went back to this plant a second time, a month or so after the first visit and

Plant office building is constructed entirely of concrete and concrete units made with Lelite aggregate

still there were no defects in the structure. However, we are interested in the product itself more than in the technique of manufacture, although that too has its interesting phases.

Anthracite coal as it appears in the face in the mine is not always pure. Due to the complexity of its origin there are seams of shale within the coal bed. To process this coal and remove that material is a highly complex procedure involving crushing, screening, washing, and heavy media separation. Tables, jigs, and similar concentrating equipment also are used. We are not interested so much in the coal fraction as we are in the shale part, for that is the raw material from which Lelite is made.

This is pointed out because here is an assured and continuous supply of raw material, of controlled quality, from current production. One need not worry about the supply becoming exhausted. In passing, and while on another project for ROCK PRODUCTS, we saw a cross sectional map of a certain area in the anthracite coal producing section. It showed a vein of coal up to 100 ft. thick—in spots 300 to 400 ft. thick. The reserves are estimated at more than 100 years.

In the complicated processing of the anthracite coal, the shale portions are bled out at the various separating points. Some of the shale portions are coarse, others relatively fine. Thus the processing lends itself in an ideal manner to selectivity. Based on many years of experimentation, these operators know how to select and to blend a raw material that is uniform in character in a physical and a mineralogical sense. The various desired "cuts" from the washer are thus selected and sent to suitable bins from which the material is shipped to the lightweight aggregate manufacturing plant in hopper cars.

The shale particles are dark grey to black in color. Within the material itself there is some free carbon. Some anthracite coal fines are deliberately added to the material before stockpiling at the plant.

Control panel in furnace plant showing some of recording devices for controlling quality of sinter

Hopper cars are unloaded into a track hopper and, via a bucket elevator, the material can be put into the bunkers which feed the furnaces, or into storage by means of an overhead stockpile conveyor that is 40 ft. high and 350 ft. long. There is sufficient capacity here to run the plant at least 30 days.

The overhead conveyor is of a type seldom, if ever, seen in the rock products industry and hence is worthy of some elaboration as to its construction and operation. One might call the conveyor an endless drag scraper made of heavy steel link construction and of large dimensions. Each scraper is about 24 in. wide and fabricated to fit the trough-like depression in which the unit operates. It operates horizontally. When worn the scrapers are easily replaced. The conveyor has the advantage of not requiring a tripper or unloader, for if the pile of material does reach to the top of the structure, the scrapers level it off, and the pile extends automatically. It can operate with hot or cold materials—fair weather or foul.

Under the stockpile a conventional reclaiming belt operates in a concrete tunnel and is provided with suitable reclaiming gates. The reclaimed material is elevated and conveyed to the feed-bunkers.

In the plant, three specially designed furnaces expand the material, converting it into a cellular, lightweight aggregate. The furnaces operate at temperatures in the 2800 deg. F. range. A considerable amount of waste heat is available, so the designers have provided three Combustion Engineering Co. Type VD waste heat boilers. Individual steam turbines (Westinghouse) are used to drive those units that must operate at the same time as the furnaces. Any unit in the plant (such as the stockpiling system) that could conceivably operate when the plant is down, has individual electric drive motors with suitable gear-reduction units.

The three furnaces for expanding or "bloating" the prepared shales measure 12 x 48 ft. The bed is an endless grate similar to those found in steam plants, and these traveling grates are said to be the longest ever built. Each furnace is equipped with a blast fan and suction fan (Buffalo).

In operation, fine anthracite coal is first ignited at the feed end in such a

(Continued on page 107)

Lelite furnace plant building; the walls of this building also were constructed of masonry units made with Lelite aggregate

MODEL 363

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PORTABLE CONVEYOR

Complete accessories are available to make the 363 Conveyor adaptable to the widest variety of operating conditions. It is shown here unloading a hopper car with a B-G 358 unloader.

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Japanese Cement Research

THE FIFTH ANNUAL convention of Japan Cement Engineering Association was held in Tokyo from May 13-18, 1951. Sixty-eight reports of research on cement and concrete were given. Those of interest to U. S. producers are presented here in abridged form.

1. Research on a Turbidimeter for Determination of Fineness, by S. Matsuo, T. Yashima and Y. Oyama, Kyoto University engineering faculty.

The authors determined the distribution of fine-grained materials using a type of photo-cell (the so-called electron multiplier) by measuring turbidity of suspended fine grains at a certain depth in the liquid. The time change in turbidity indicates the grain distribution.

To ascertain the reliability of the apparatus and possibility of its practical use, the samples were analyzed at the same time with Wiegner's apparatus.

Comparing the results obtained by both methods, it was found that the authors' method can be used with the same reliability as Wiegner's method in the determination of grain distribution of fine materials.

2. Research on Fineness of Cement Raw Materials, by K. Watanabe, M. Kajii and K. Yamane, Central Research Laboratory, Ube Kosan Co., Ltd.

The authors investigated the relation between fineness of raw materials and crystal size of main clinker minerals, amount of free lime and compressive strengths of cement.

They found that, even if the raw mixes have the same specific surface area, when the individual elements, limestone and clay, have different surface areas, the clinkers show different contents of free lime, clinker minerals and cement strength, and there is a certain fineness most favorable for cement burning. For most favorable burning, the ratio in specific surface area, clay to limestone, $\frac{\text{C s.a.}}{\text{L s.a.}}$ must be 1.00 for low lime cement, and 1.40 for high lime cement.

3. Research on Weathering of Cement, by K. Miyazawa and K. Nogi, Iwaki Cement Co., Ltd.

The authors studied the weathering of cement by examining changes in setting time, strength, fineness and free lime content. The cements were further examined by heat balance and electron microscope.

The liquid phase of weathered and non-weathered cements during setting was extracted by means of Roller's machine, and compositions of the liquid phase were compared. Some observations on abnormal setting were made from the results.

4. Determination of Free Lime in Cement, by K. Fujii, Chemical Industrial Research Institute, Tokyo.

In the 4th annual convention of the association in 1950, the author reported on a method of determining free lime in cement by means of tribromphenol, using ethanol as extracting solution. The method was later improved by substituting for ethanol the less hygroscopic butanol or isopropyl alcohol.

In this report the author separated clinker powder by means of air analyzing apparatus into several parts of different grain size and analyzed for free lime. It was found that finer parts always contain more free lime than coarse ones. In grinding clinker grains with solvent in an agate mortar, coarse grain gives out more free lime than fine grain. Some portion of free lime is trapped in clinker grain, and can hardly be extracted by the solvent. This could be the case for all methods of free lime determination, and it is necessary to make some correction.

5. Determination of Free Magnesia in Portland Cement, by K. Miyazawa and M. Amemiya, Iwaki Cement Co., Ltd.

The author traced several determination methods for free magnesia, and found Bogue's method gives satisfactory results. He felt, however, some inconvenience with this, because it necessitates not only too long a time, but it is also a little difficult to detect the end point of the reaction clearly, so he modified Bogue's method as follows:

(1) Substituting ethyl alcohol with methyl alcohol to shorten time for testing and make the end point clearer.
(2) Addition of a small quantity of oxalic acid (reacts to shorten the time for determination).
(3) Substitution of glycerin by ethylene glycol, makes filtration easier.
(4) Fine grinding of sample (passes No. 325 sieve) and further rubbing the sample with alcohol in agate mortar.

6. Rapid Determination of Sulfur Trioxide in Cement, by Y. Matsuzaki, Iwaki Cement Co., Ltd.

Author examined sodium rhodanate as indicator for titration of SO_3 in cement. It shows fair agreement with gravimetric method. The time required for titration was about one hour.

7. Research on Abnormal Setting of Portland Cement, by R. Naito, Central Research Laboratory of Onoda Cement Co., Ltd.

The author prepared a great number of cements with various chemical composition, different fineness and gypsum content, studied the cause of abnormal setting by weathering, and found some relation between cement compounds for C_3A and C_4AF, and abnormal setting. With increase of fineness, flash setting occurs more often. Gypsum content is also intimately connected with flash setting caused by weathering.

8. Effect of Fe_2O_3 on Mineral Constituents of Clinker and Cement Strength, by R. Naito and M. Ueda, Central Research Laboratory, Onoda Cement Co., Ltd.

The authors studied effect of Fe_2O_3 on cement quality. Using microscope and x-ray, they found the occurrence of interstitial material is strongly affected by the Fe_2O_3 content; prismatic dark interstitial material can be observed only in clinker whose Fe_2O_3 content exceeds 3.0 percent, and the ratio Al_2O_3/Fe_2O_3 is over 1.78.

Increasing Fe_2O_3 makes compressive strength higher, while high early bending strength can be attained by increasing Al_2O_3. Even the cement low in lime and silica can attain equally high strength as high lime-high silica type cement, if the content of Fe_2O_3 is increased a certain amount, thus increasing the percentage of C_3S.

9. Determination of Burning Degree of Cement Clinker by Porosimeter, by T. Yoshii, Chichibu Cement Co., Ltd.

The author applied the porosimeter designed by E. W. Washburn and E. N. Bunting[1] for determining porosity of clinker, discovered burning degree can be found quickly and quite correctly by porosity.

Under the same conditions of cement burning, the relation between and volume weight of clinker makes a straight line. The volume weight has been applied for testing burning degree of clinker by numerous investigators[2].

At the author's plant clinker of about 19 percent porosity gives the highest strength of cement as shown in Fig. 1. Porosity of clinker in most Japanese cement plants was found to be 11.4 to 34.8 percent, an average of 22.5 percent.

10. Influence of Grinding Media on Cement Grinding, by S. Suzuki, Chichibu Cement Co., Ltd.

The author studied the influence of grinding media on cement grinding for a long period of time, using a 4-compartment mill, changing shape, size and quantity, and found a suitable charge of grinding media improves not only the mill efficiency but also cement quality.

11. Research on Basic Brick for Ce-

Translated and abridged by Dr. K. Koyanagi, director, Japan Cement Engineering Association, Tokyo.

1. J. A. Cer. Soc. Vol. 5, (1922).
2. Anselm, Zement (1936); Wuerzner, Zement (1938); Mussgang, Zement (1937).

(Continued on page 100)

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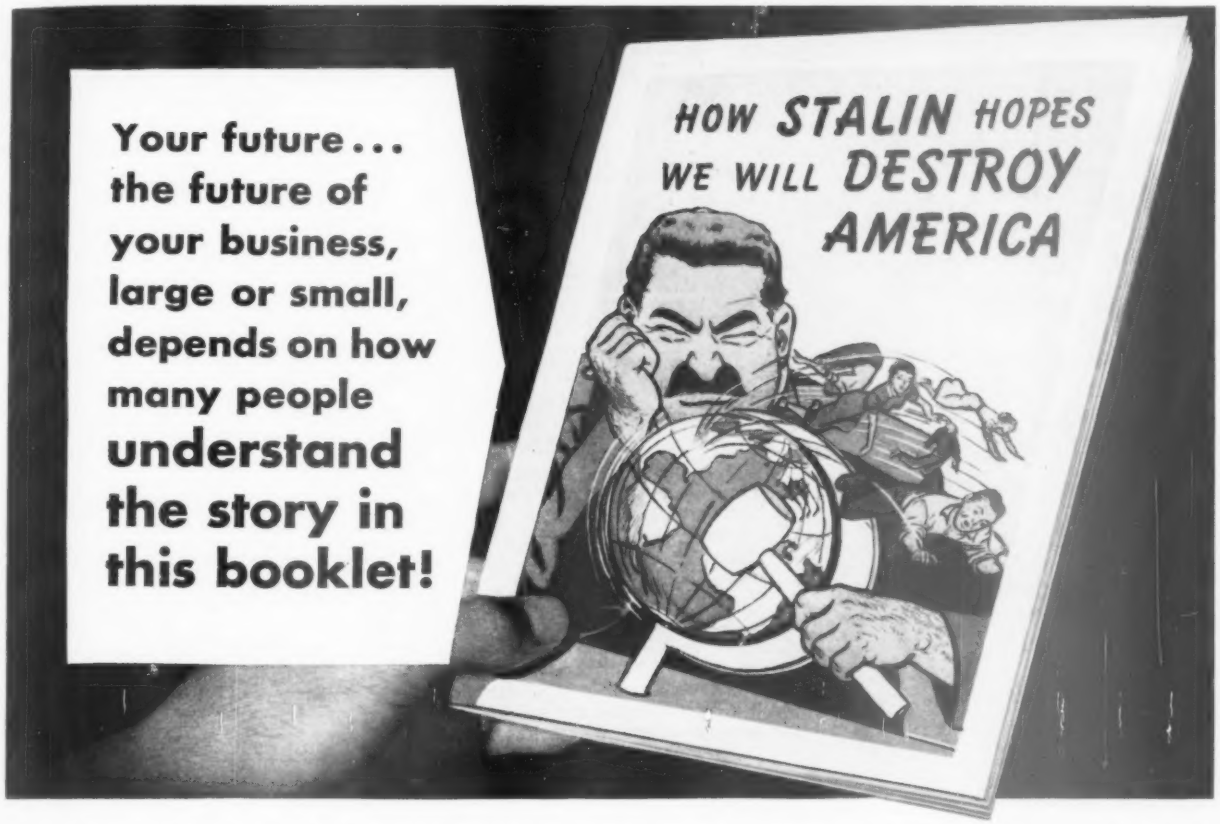

Businessmen recognize ***inflation*** *as the nation's greatest single threat. But most of us have felt "What can one man—even one business—do to stop it?"*
But there is a way—if enough of us work at it. We can help more people . . . the men and women who work and vote and pay taxes . . . to understand the nature of inflation, its ***causes*** *and* ***cures****. Then we will have gone a long way toward eliminating this pending catastrophe.*

ONE TOOL YOU CAN USE: To help us give our own Bemis workers the inflation picture, we used the colorful, new 16-page booklet "How Stalin Hopes We Will Destroy America" produced by Pictorial Media, Inc. The more widely the booklet is used, the more good it will do . . . and it is available for distribution to your workers, too. It follows the time-proven "comic book" technique . . . dramatizes the dangers . . . and shows how all our citizens can help halt inflation before it's too late.

TESTS SHOW IT HELPS WORKERS: To get an impartial judgment of the value of "How Stalin Hopes We Will Destroy America," it was tested in Bemis plants by the Psychological Corporation under the direction of Dr. Henry C. Link, a foremost research authority. Dr. Link says "Those workers exposed to the booklet were found to have a significantly higher appreciation of the recommended ways to stop inflation than did the workers who did not see the booklet. Details of this test are available upon request." And Bemis factory workers make such statements as "Everything it says hit home, but you'd never figure it out for yourself until you read it". . . ."It's told in an interesting way so anyone can understand. My daughter, age ten, understood all of it". . ."In picture form it impresses you more. Most people don't read about it". . ."Had ideas that we wouldn't think about otherwise while we are working away—good book, agree with it—I guess I won't be the only one."

Because we believe this message is growing more urgent every day, Bemis is taking this means to commend to other businesses this weapon against inflation. It is the first of a series of such material that we expect to use.

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ment Kiln by Domestic Resources, by K. Takahashi, T. Iida and M. Ishii, Nippon Cement Co., Ltd.

In the U. S., magnesia and magnesium silicate brick have lately been used in cement kilns, with very good

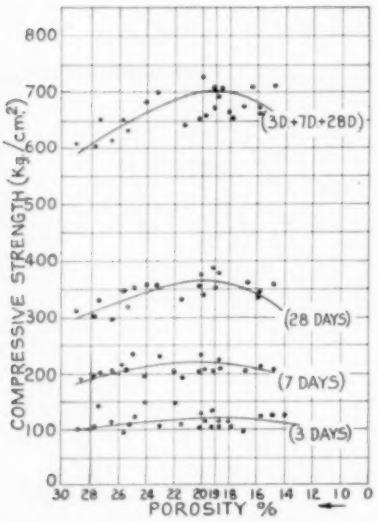

Fig. 1: Porosity of clinker and compressive strength of cement

results. As no magnesite is produced in Japan, the authors used dolomite and serpentine with some mineralizer to make brick composition, which consists mainly of periclase (MgO), merrvinite ($3CaO \cdot MgO \cdot 2SiO_2$) and dicalcium silicate, burning temperature being about 1540 deg. C.

The brick shows no dusting, and very little spalling; its expansion during heating, however, is a little high, which must be improved by further research.

12. Some Problems on the Diffusion by Turbulent Flow from Pulverized Coal Burner, by K. Saji, Nippon Cement Co., Ltd., Nishitama plant.

From the theory of turbulent diffusion of a jet flow and data obtained from cement kilns in a plant with test burner, the author discusses the relation among flame length, coefficient of burning velocity, diameter of burner and initial velocity of the jet flow into the kiln.

13. Research on Sulfate-Resisting Cements, by K. Asaoka and M. Ishii, Central Research Laboratory, Nippon Cement Co., Ltd.

The authors investigated the effect of sulfate solutions on the strength of 1:5 sand mortar of various types of cement by immersing the specimens in solutions of Na_2SO_4 and $MgSO_4$ (concentration 0.15 mol/liter) which is more dilute than the solution hitherto generally used.

Normal and high early strength cement showed a great decrease in strength after 3 months, while medium- and low-heat cements showed a small increase after the same length of time. A special cement low in C_3A prepared by the authors showed the best results.

14. Research on Cement for Road Construction, by K. Chujo, S. Sekino and M. Kondo, Central Research Laboratory of Nippon Cement Co., Ltd.

The authors studied shrinkage and chemical composition of various types of commercial portland cement and obtained the following formulas:

S (14 days) = $0.19\ C_3S + 0.07\ C_2S + 0.97\ C_3A + 0.55\ C_4AF$

S (28 days) = $0.20\ C_3S + 0.16\ C_2S + 1.03\ C_3A + 0.28\ C_4AF$

where S is shrinkage in mm/10m of neat cement test piece.

The effect of C_3A and C_4AF upon shrinkage is fairly great in comparison with C_3S and C_2S.

They prepared further various kinds of cement for road construction in test kiln, tested for strength and shrinkage, with or without air-entraining agent, or with replacement of cement pozzolans, fly ash and granulated blast furnace slag.

15. Determination of Alkali in Portland Cement by Flame Photometer and Alkali Contents of Japanese Cement, by T. Umemura, Central Research Laboratory, Nippon Cement Co., Ltd.

The author tested 15 samples of portland cement for alkali, using Perkin-Elmer 52-A flame photometer, in accordance with A.S.T.M. Designation C228-49T, and compared with results of gravimetric method. The difference between the two methods was 0.040 percent for Na_2O and 0.017 percent for K_2O.

Thirty-one samples of commercial cement of different brands were tested by flame photometer. The total alkali (calculated as Na_2O) was found to be 0.88 percent maximum and 0.30 percent minimum, average 0.63 percent. Japanese portland cements seem to be generally lower in alkali than those of U. S. companies.

16. Research on Hydraulic Property of Granulated Blast Furnace Slag; On Crystallization Heat and Latent Hydraulic Power of Granulated Slag, by T. Tanaka, Central Research Laboratory, Onoda Cement Co., Ltd.

The author measured heat of solution, by means of calorimeter, of granulated slag, heated at two temperature stages: 700 deg. C. and 1100 deg. C. (700 deg. C. is end point of ignition loss and 1100 deg. C. is end point of exothermal reaction by heating), determined indirectly the crystallization heat, developed when the glassy slag is devitrified by heating. The slags heated at the two stages show different values in heat of solution. The difference is considered to come from devitrification. The heat of crystallization was compared with strength of cement, prepared by adding a small quantity of portland cement clinker to the slag and grinding to the same fineness. These values are plotted on a graph as shown in Fig. 2.

In Fig. 2 strength value shows total sum of bending and compressive strength of 3, 7 and 28 days. The plotted points fall nearly on a straight line. Thus the latent hydraulic power of granulated slag can be determined closely by heat of crystallization. (M is a long time stored, weathered cement).

17. Research on Physical and Chemical Change of Pozzolans by Calcination, by T. Yoshii and G. Murakami, Chichibu Cement Co., Ltd.

The authors examined Japanese pozzolans by microscope and x-ray for their mineral constituents. They calcined Kibushi clay (typical kaolinite type) and bentonite (montmorillonite type) at 400-1200 deg. C. and examined the change in structure by x-ray, strength of lime-pozzolan mortar, reduction in alkality and dissolved SiO_2 and Al_2O_3 in 1N NaOH solution.

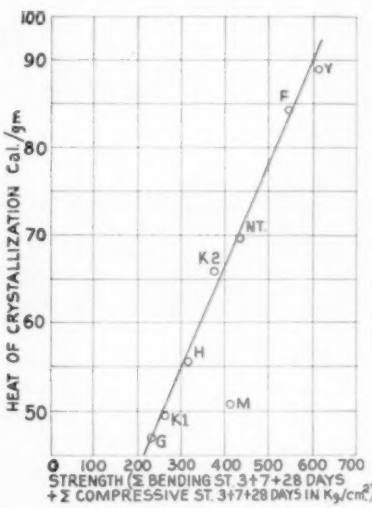

Fig. 2: Heat of crystallization of granulated slag and strength of portland-slag cement

18. Application of Low-Temperature-Melting Glazes on the Surface of Cement or Concrete Products, by T. Sakai, architect, Institute of Constructural Ministry.

The author devised a method of applying low-temperature-melting porcelanic glazes on the surface of cement and concrete products. The method consists of two treatments as follows:

(1) Applying an insulating medium of about 3 mm. thickness on the surface of cement products. The composition of insulating medium, for example, is as follows:

Insulating medium—

Pumice powder .....75 percent

(Continued on page 102)

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How a machine shop saved 30¢ per pound through direct shipments of N-B-M "Tiger" Bronze Bars.

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Portland cement .....20 percent
Sodium silicate ..... 5 percent

(2) Finishing the surface with glaze, consisting of some easily melting powder and adhesive materials. After complete drying, the surface is heated by means of "flame-brush" of an electric arc for a very short time at about 1200 deg. C.

Some examples of glaze are given in the following table:

Composition of glaze (white color)

1—
Borax .....50 percent
Silica sand .....15 percent
Feldspar .....20 percent
Limestone ..... 5 percent
Water glass .....10 percent

2—
Zinc silicate .....40 percent
Silica sand .....25 percent
Feldspar .....20 percent
Limestone .....10 percent
Sodium silicate ..... 5 percent

The glaze of various colors can be obtained by mixing some mineral pigments in the above mixture.

The glaze can also be applied on the surface of gypsum and cement wood board, making them fire resistant.

The glaze is not only fire resistant but also waterproof. It can be applied on the concrete wall after construction.

19. Research on the Shrinkage of Asbestos-Cement Products, by A. Iida and R. Yageta, Central Research Laboratory, Nippon Cement Co., Ltd.

The shrinkage during hardening and drying is considered one of the chief origins of hair cracks on the surface of asbestos-cement products, especially corrugated plates.

The author studied the relation between shrinkage and contents and fineness modulus of asbestos and water percentage, and obtained the following formula:

$S_{28} = 3.861\ S \times W$

Where S_{28} is shrinkage of asbestos-plate in mm/10m. after 28 days.
S shrinkage of neat cement in mm/10m., w/c 0.35, at 28 days.
W absorbed water in percent.

20. Cement Production in 1950 and Forecast for 1951, by S. Ito, Cement Manufacturer's Association.

The 1950 cement production amounted to 5,200,000 tons, which exceeded by about 20 percent the estimated amount of 4,200,000 tons.

The effective demand for 1951 is estimated to be a little more than 5,600,000 tons, of which 700,000 tons are for export.

The total number of cement kilns in Japan at the end of 1950 was 82, of which 69 were running. This year 15 new kilns will be placed in service, so the production should be 7,200,000 tons; this is 116 percent of the highest production before the war.

21. Research on Alkali-Aggregate Reaction of Concrete, by Y. Kondo, Kyoto University and K. Kitagawa, Osaka Yogyo Cement Co., Ltd.

The authors reported the deterioration of concrete at Murayama and Nagasaki bridges on Mogami river in Yamagata prefecture. The aggregates used for the construction contained shally substances in quite large quantities, which were found by chemical tests to be reactive. The deterioration is considered to be caused by alkali-aggregate reaction.

The second case of concrete expansion occurred in the breakwaters of a harbor. The aggregate used for concrete is non-reactive. Noticeable is the fact that the expansion occurs only in the concrete in which coarse ground volcanic ash was used for replacement of portland cement. The deterioration in this case might perhaps be caused by inadequate mixing of coarse volcanic ash in the cement.

The authors also reported the results of tests on a large number of aggregates in Kinki, Shikoku and other districts for alkali reactivity by petrographic examination, chemical testing and mortar bar expansion test.

For activity testing of pozzolans, they applied, besides ordinary testing methods, the sonic method, which showed the same results as expansion-reduction testing of mortar bar.

22. Study of the Electric Current Occurring in Cement Mixture, and its Utilization, by F. Ohama, Yamaguchi University.

A very weak electric current occurs when the liquid phase of a cement mixture and solid phase come in contact, being caused by potential difference between two electric poles.

The author noticed this phenomenon, and tried to utilize the current in the field of concrete testing, especially testing of concrete properties in the earlier period of hardening.

"Open-End" Contracts

NATIONAL CRUSHED STONE ASSOCIATION has issued a memorandum on a recent decision of the Public Contracts Administrator, dealing with the government, or contracts which are indefinite as to total contract amounts.

As stated in the memorandum, the Walsh-Healey Act applies to prime government supply contracts in any amount exceeding $10,000 and requires special conditions of employment for those employes engaged in the performance of the contract. These include daily and weekly overtime, minimum wage and child labor requirements, etc., and penalties are provided for violations. The official rulings and interpretations under the act require that all contracts of indefinite amounts which may exceed $10,000 should include the stipulations required by the act, unless the contracting officer knows in advance that the total amount of the contract will not exceed $10,000 in any event.

In a recent decision, the contracts in question included the act's stipulation and when the administrator found that the contractor had failed to pay overtime compensation as required by the Walsh-Healey Act, he assessed liquidated damages against the contractor in the amount of the unpaid overtime. N.C.S.A. warns that companies accepting open-end or indefinite quantity government supply contracts should be careful about this situation. They should have an understanding with their contracting officer at the outset as to whether the Walsh-Healey Act is or is not intended to apply to the particular contract in question. If the act is not intended to apply, the contractor should insure that the contract terms do not include the Walsh-Healey Act provisions, which usually means deletion of such provisions on the printed forms and having such deletion initialed by the government contracting officer. However, the contracting officer may be unwilling to do this if total deliveries under the contract are likely to be near the $10,000 mark by the time deliveries are completed. In such case, it was advised that a company may insert in its government bid or proposal and, in the subsequent contract, a provision to the effect that "in no event shall the total tonnage deliveries required under this contract exceed the equivalent of $9900." With such a provision in the contract, the contracting officer will know in advance of his execution of the contract that the Walsh-Healey Act does not apply, and in such case, should be agreeable to striking out the Walsh-Healey Act provisions in the printed contract form.

It was pointed out, however, that in those cases where the prospective size of the contract was likely to substantially exceed $10,000 in amount, or where by reason of collective bargaining agreements or other circumstances whereby the company is already maintaining conditions of employment equal to or greater than those required by the Walsh-Healey Act, the foregoing suggestion would be neither applicable nor desirable.

Limestone Quarry Opened

A NEW DOLOMITIC LIMESTONE QUARRY has been opened at Chesapeake, Mo., for the production of agricultural limestone. The limestone contains about 25 percent magnesium and the new quarry is expected to fill a need for farmers in that area since the nearest other dolomitic limestone quarries are in Bolivar or Marshfield. The quarry's deposits have been analyzed and have received the approval of the P.M.A. for use under its program.

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JOY Series 100 compressors are available in two and four cylinder models and in single and twin units. Capacities from 378 to 3656 c.f.m.

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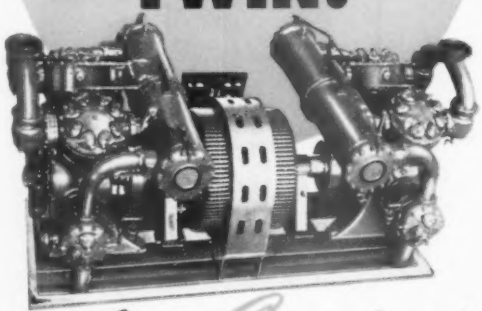

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Control of Tailings

(Continued from page 70)

pipe lines that are mounted in a tunnel under the thickener. These connect with a surge tank which has a top elevation about the same as the overflow weir on the thickener. Connected to this surge tank are four Wilfley sand pumps, two 8 in. and two 6 in. Thus the assembly can be compared to a U-tube, one leg of which is the thickener and the other the surge tank.

The four pumps are used to control the gravity of the pulp from the thickener. If, for instance, four pumps are in use, the "head" in the surge tank will be low, and the discharge rate from the thickener will be rapid, with a correspondingly low specific gravity. In such event the operator shuts off one or more of the pumps and the head in the surge tank rises to an elevation that is slightly less than the head in the thickener. This means a slowing down in the rate of flow from the thickener, with an increase in the specific gravity of the pulp. By taking specific gravity readings at stated intervals, the operator starts and stops the pumps to maintain the figure at 52 percent solids. One operator is kept here on each shift. The thickener operates at one revolution per 40 min.

At the second pump lift nearer the tailing pond are three 8-in. Wilfley pumps that are connected to a small tank that receives the pulp. The outlets to the pumps are from the bottom of this surge tank and the suction pipe in the bottom of the tank extends upward from the floor of the tank for a foot or more. The top of this suction pipe is closed and, to receive the pulp, a series of vertical ports is provided in it. Over this assembly is a second pipe which is so installed that when the latter is raised, the flow of pulp is at its maximum. By lowering the second pipe (like a sleeve) the ports can be entirely or progressively closed off. Control of these company-made valves is from a series of hand wheels on top of the surge tank. A second feature of interest at the pump house is that the motor for each pump is in a small structure and the pumps kept outside. Thus if a runner has to be changed, or a gasket "blows" in the pump case, the motor is not in any danger.

White iron-chilled runners last about 14 days in this service. An alloy (Diamond) runner supplied by Pettibone Mulliken Corp. was said to last from 4 to 5 months. White iron cases last 10 days to 4 weeks, the difference being mainly due to pin-holes in the castings. Rubber-lined cases will last 300 days (plus). The cost of the alloy runners is such that they must last six times as long as the chilled cast iron in order to pay off. The rubber-lined cases will pay for themselves if they last four times as long as the white iron.

Offices of the Miami Copper Co. are at Miami, Ariz. R. W. Hughes is general manager, B. R. Coil is assistant general manager, Joe Smith is concentrator superintendent and Charles Curtis is chief metallurgist.

Israel Needs Lime Kilns

A SURVEY BY the Israel Government Investment Center has revealed that Israel needs at least eight new lime kilns with capacity to produce about 30 tons per day each, as was reported in *Economic Horizons*, monthly publication of the Economic Department of the Jewish Agency for Palestine.

The survey estimated that the investment required for each kiln, including quarrying and stone-crushing equipment, installation, buildings, roads, etc., is $275,000. Facilities existing at ten different locations in Israel aggregate an estimated yearly production of about 80,000 tons. Based on present building activity in the country and on anticipated construction of new buildings, it is expected that the demand will reach approximately 165,000 tons annually within the next two years, compared with present requirements of about 85,000 tons. Investors could anticipate capacity operations for the years ahead.

Opens Stone Quarry

GENE MCCLAIN, Kirkville, Iowa, is opening a rock quarry near Kirkville. A modern plant is being installed.

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The EUCLID ROAD MACHINERY Co., CLEVELAND 17, OHIO

EUCLIDS

Labor Relations Trends

(Continued from page 51)

mutual mistake in including the discriminatory clause in their July 19 contract, neither the respondent company nor the respondent union [Cement Workers] agreed to, or intended to enforce, a discriminatory contract, and therefore did not actually create discriminatory conditions of employment, either before or after the correction of the clause." * * * * "Similarly, in the absence of any intent on the part of the respondent union to obtain or enforce a discriminatory contract, and the resultant absence of any discriminatory conditions of the employment actually created by it and the respondent company, the two elements which the Board held must be present in order to have a violation of Section 8(b)(2) in this situation, we find that the respondent union has not violated Section 8(b)(2) by virtue of the discriminatory clause in the July 19 contract."

Board's Decision and Order

Since there was obvious coercion of employes into changing from C.I.O. to A.F. of L. the N.L.R.B.'s order was as follows: "Employer shall cease and desist from interfering with administration of, or contributing support to, United Cement, Lime and Gypsum Workers, Local 291, A.F. of L.; recognizing such union prior to certification or giving effect to contract with union; coercing employes to become or remain members of union by apparent threat to discriminate against nonmembers; in any other manner interfering with employes' self-organizational rights. Withdraw and withhold recognition from union prior to certification; post notice [to that effect].

"Union (Cement, Lime, Gypsum Workers) shall cease and desist from coercing employes to become or remain members by apparent threat to discriminate against nonmembers; in any like or related manner restraining or coercing employes in the exercise of their self-organizational rights; post notice."

Greek Cement

(Continued from page 88)

boiler is to be installed to develop steam for generating the total required power. Its capacity is 40,000 bbl. of steam per hr. at 400 p.s.i.

It is expected that these new additions will increase production to about 200,000 tons per year. E.C.A. provided $1,000,000 to purchase the equipment for this plant.

Titan Plant

Titan Cement Co. is the second largest cement manufacturer in Greece, with a plant located at Eleusis, about 15 miles from Athens.

This plant was recently completed. F. L. Smidth has supplied two 9-ft.

8-in. x 350-ft. dry process rotary kilns, two 9½- x 21-ft. raw grinding mills driven by individual 750-hp. Metropolitan Vickers motors and two 7½- x 36-ft. three-compartment finish mills.

It is expected that these new additions should bring production in 1952 up to about 300,000 metric tons.

The kilns are provided with special heat-exchanging devices in the upper end and are to be fed with nodulized raw material. The nodulization takes place in a special nodulization drum, and the nodules are fed to the kiln with 12 - 16 percent water. E.C.A. provided $1,960,000 toward the purchase of equipment for this plant.

Conclusion

Total cement production in Greece was about 400,000 tons in 1950. The 1948-1949 recovery program provides for an additional capacity of 600,000 tons.

As mentioned, a net increased capacity of 630,000 tons is expected early in 1952, i.e., more than 250 percent higher than the present output. Oil consumption in the old plants varies between 160 and 170 kg. per ton of cement. With the new long kilns it will be 30 percent lower.

Producers are optimistic about prospects for 1952, and the volume of construction awards and projects planned by E.C.A. seems to warrant optimism. No shortages of material or labor are foreseen which might handicap production.

It is estimated that sales may reach 550,000 tons by 1955. Apparently, the capacity of all the old and new plants will exceed local demand for the present and probably for several years ahead, and large quantities of cement are expected to be available for export to Near East markets.

Processing Tailings

(Continued from page 95)

manner as to provide a thin bed of burning coal. As the grate moves forward in the totally enclosed furnace, a thick layer of the blended shale is superimposed on the burning mass. As this bed of material moves forward, temperatures rise until the material is semi-plastic. Gasification of certain constituents within each particle converts it into a cellular mass with the cells from pin head to microscopic in size. The particles are vitrified, and knit together, to form a continuous ribbon or slab. As this emerges from the rear of the furnace, it is cooled sufficiently to be further processed.

After the ribbon of Lelite emerges from the furnaces and is cooled, it is passed through a "breaker." This is a horizontal shaft of heavy construction with lugs at right angles to the shaft, and these lugs break the slab into large lumps. The lumps then pass through a set of toothed rolls of large dimensions, after which the material is carried on an inclined drag-type conveyor (similar in operation to the

one previously described) and delivered to an outside ground storage system.

The stockpile of semi-finished material has a reclaiming belt in a tunnel under it and the material is reclaimed and elevated to the top of the screening and recrushing plant. In this plant there are two circuits, each with two double roll crushers and two double-deck, Link-Belt vibrating screens. Also located in this structure are nine storage bins with a total capacity of 500 tons that are used for truck and car loading.

Lelite is said to have excellent insulating properties with exceptional heat resisting characteristics. It is chemically inert and does not react with cement. It also has high refractory properties. The finely ground Lelite is being investigated and indications are to date that it has high pozzolanic properties. The weight of fresh wet Lelite concrete will vary from 105 lb. per cu. ft. to 115 lb. per cu. ft. for concretes of strengths from 2000 p.s.i. to 4000 p.s.i. The dried Lelite concretes will weigh from 90 to 100 lb. per cu. ft.

Typical gradings of the two sizes of Lelite used in poured structural concrete are shown below:

Percentages Retained (cumulative)

Tyler sieve size	No. 8 sand	¾-in. size
¾	0.0	0.0
(½)*	0.0	(30.0)
⅜	0.0	50.0
No. 4	0.0	95.0
No. 8	0.5	96.0
No. 16	30.0	97.0
No. 30	60.0	98.0
No. 50	75.0	99.0
No. 100	(92.0)	(100.0)
F.M.	2.50	6.35

*Not used in computing F.M.

Lelite meets all requirements of A. S. T. M. specification C-130-42, "Standard Specifications for Lightweight Aggregates for Concrete."

For structural concrete (2000-4000 p.s.i.) 55 percent No. 8 sand and 45 percent ¾ in. size, dry weight, is an average recommended proportion.

The absorption by Lelite is greater than natural aggregates, being about 6½ percent in the proportions commonly used. Therefore, prewetting of the materials is recommended. (It will be noted that the absorption figure of 6½ percent is on a weight basis. If this were to be compared with the absorption figures for heavy aggregates, the figure would be around 3¼ percent.) This prewetting—about 5 percent—is desirable to avoid segregation and absorption of the mixing water. However, in using Lelite, it is not necessary to add most of the mix water before adding the cement, as is recommended for some aggregates.

In addition to the two sizes shown in the tabulation, Lelite is produced in a No. 4 sand size, and also in an intermediate size. The latter is 100 percent minus ½ inch.

Offices of the Lehigh Materials Co. are located at Lansford, Penn., with sales offices in New York City. Evan Evans is president of the firm, John L. G. Weysser is manager, A. T. Beckwith is plant superintendent and Robert Taney is plant foreman.

Steel Shortage Growing

NATIONAL INDUSTRIAL SAND ASSOCIATION recently stated in a letter to member companies that there is growing apprehension in industrial and governmental circles about the threatened collapse of the Controlled Materials Plan. A recommendation has already been submitted that CMP be discarded at the end of the third quarter and that N.P.A. confine its efforts to the allocation of steel tonnage for direct military or for absolute support of direct military purposes.

It was stated that nobody seems satisfied with steel allocations for the third quarter and it is expected that there will be no free steel in the fourth quarter, the total amount being covered by CMP allotments which total 21,000,000 tons. The expectation is that steel production in the fourth quarter will be between 19,000,000 and 21,000,000 tons.

N.I.S.A. further stated that companies holding CMP "tickets" are shopping around to get steel and are being turned down; that CMP allocations are assuming the proportions of a DO-97 hunting license despite all the extravagant talk about CMP; that priority ratings were supposed to become a thing of the past. It is felt that these predictions for CMP efficiency are beginning to look bad and that there is a growing feeling that Mr. Wilson will have no choice about discarding CMP if something like industrial chaos is to be avoided. (One industrial observer was reported to have remarked that CMP stood for "confusion made permanent.")

It was also stated that the other two principal controlled materials, aluminum and copper, are in an equally untenable position.

Vermiculite Association Meeting

THE ANNUAL MEETING of The Vermiculite Association, Inc., was held on June 27, 1951, at the Biltmore Hotel, New York, N. Y.

William S. Steele, president of American Vermiculite Corp., New York City, chairman of the association, presided at the meeting.

R. L. Wilkerson of Southern Mineralite Corp., New Orleans, La., and Henri R. Bastien of Vermiculite Insulating Ltd., Montreal, Canada, whose terms expired, were re-elected to three-year terms as directors. Other members of the board are John A. Cawley, American Vermiculite Products Corp., South Kearney, N. J.; N. M. Bernier, California Stucco Co., Cambridge, Mass.; W. C. Marshall, F. E. Schundler & Co., Inc., Long Island City, N. Y.; and J. W. Lewellen of Hyzer & Lewellen, Southampton, Penn.

Messrs. Steele, Bastien and W. S. Elliott were re-elected as chairman, vice-chairman and secretary-treasurer, respectively.

The activities of the association in the standardization of vermiculite

grading were endorsed and extended and it was shown that only by screening after expansion can constant uniformity of materials be maintained. Controlled screen sizes for both plaster and concrete aggregate, for example, exercise a strong influence on the water ratio and drying time of both plaster and concrete.

It was announced by Mr. Elliott that preparations for the column test at Underwriters Laboratories had been completed and that the test was to take place on July 30, 1951, in Chicago. The test structure was to be made up of 2⅜-in. plaster boards tied with wire to form a box around the column, covered with 1¼ in. of vermiculite plaster and conventional white putty coat.

Tests of the acoustical properties of vermiculite plaster were also authorized at the meeting.

Improved gradings for the use of vermiculite as a fertilizer aid and as packing material for corrosive and temperature-sensitive products were adopted. A number of tests by various agencies are now being conducted.

One of the most important developments at the meeting was the final adoption of association specifications for vermiculite concrete roof insulation which have been under test for a number of years by several association members, with excellent results. This specification, VA-C1, does not permit a mop coat to be applied to the vermiculite concrete slab. Mixing and installation methods are standardized to insure against the possibility of bulging under any sort of climatic conditions.

Crude vermiculite grading and the characteristics of various types of crude vermiculite from South Africa, Rhodesia, Montana, Canada and the Carolinas were discussed at considerable length.

The secretary reported an unusual interest from overseas in possible membership in the Vermiculite Association. Applications and inquiries from South Africa, the United Kingdom and Europe were discussed. Currency difficulties for payment of dues and assessments were serious obstacles to membership in many cases.

The advantage to the association in an intimate interchange of data with leading vermiculite processors and producers from abroad was considered to be highly desirable; therefore, special arrangements for foreign members were approved by the association.

It is planned that the bulletin service of the association will be developed for general distribution by the member companies, with releases planned on approximately a monthly basis.

Wage and Salary Stabilization

THE WAGE CONTROL PROVISIONS of the extension of the Defense Production Act, which will now expire on June 30, 1952, effected only a minor change which does not apply to the

rock products industry. However, it is expected that the Wage Stabilization Board will make changes in Regulation 5 which deals with individual wage increases for merit and length of service, and in Regulation 6, which limits permissible wage increases to 10 percent over the rates in effect during the base period which is the nearest payroll week to Jan. 15, 1950.

In the meantime, W.S.B. has made other decisions which do affect the industry. National Industrial Sand Association has summarized these provisions and they are, in part, as follows:

Regulation 14 authorizes continuance of customary bonus practices without prior board approval. The Salary Stabilization Board announced that until its own regulations are issued, it will authorize payment of bonuses in accordance with W.S.B.'s Reg. 14. Local offices of the Wage and Hour Division will receive applications for approval of bonus payments not authorized by Reg. 14. Regional Wage Stabilization Boards are expected to be set up at an early date.

Regulation 13 of W.S.B. establishes a new "fringe" policy. Board approval of the specified fringe benefits is still required, but the board will approve applications for the stipulated fringe benefits which "do not exceed prevailing industry or area practices either as to amount or type." Health, welfare and pension plans are not covered by Reg. 13, but the board is preparing a regulation dealing with employer payments for these purposes.

Concerning increases required by the Wage and Hour Law, W.S.B. adopted the following resolution:

"The board hereby resolves that payments required for compliance by the Fair Labor Standards Act of 1938, as amended, may be included, without specific board approval, in the base pay period wage and salary levels specified by Section 2 (a) and (c) of General Wage Regulation 6, including such payments made after the base pay period. Such payments need not be counted against the permissible increase under General Wage Reg. 6."

The Salary Stabilization Board, under date of July 5, 1951, issued General Salary Stabilization Regulation 1, which adopts essentially all of the provisions of the general wage freeze order of January 25, 1951, and the stabilization regulations subsequently issued by W.S.B. Where reports on applications are required, they should be filed with S.S.B. and not with W.S.B. Procedures required by S.S.B. should not be initiated through local offices of the Wage and Hour Division or the Regional Wage Stabilization Boards, but should be initiated directly with S.S.B. at Washington. S.S.B. has jurisdiction over the compensation of executive, administrative and professional employes and outside salesmen, as these terms are defined by the regulations issued by the Administrator of the Wage and Hour Division.

Construction Authorization

NATIONAL PRODUCTION AUTHORITY recently issued "Criteria For Processing M-4 Applications," along with a complete set of interpretations and definitions on the basic construction orders. N.P.A. states that authorization for construction will be granted only when it can be established that it: (1) furthers the defense effort; (2) is essential to public health, welfare or safety; (3) will alleviate or prevent hardship to a particular community, and (4) where relatively small amounts of critical materials are involved and materials are on hand or readily available locally.

To make available all possible materials and services for defense production, the granting of authorization and exceptions to permit the commencement of construction of buildings, structures or projects specified in N.P.A. Order M-4, the following principles have been outlined:

1. It is essential that all construction be reduced to the minimum necessary for the defense effort.

2. Reduction in the consumption of materials and services made use of by construction operations can be achieved by the elimination of nonessential projects or parts thereof, by deferring projects not needed immediately or, in addition, by appropriate changes in design and construction methods which will favor the use of those materials which are most plentiful.

3. In general, all construction shall be of structural stability sufficient to meet the needs of the service which the structure is intended to fulfill. In processing applications, more favorable consideration will be given to such proposed construction which does not utilize controlled materials.

4. Mechanical and electrical features and other facilities should be reduced to bare essentials; electrical systems shall be of the simplest designs practicable.

5. The granting of an authorization to commence construction will not relieve those to whom it is granted from complying with all orders of the N.P.A. prohibiting or limiting the use of certain materials.

Section 4 of N.P.A. Order M-4 prohibits the commencement of construction of certain types of buildings, structures and projects. In those cases where the work done on the site qualifies under the definition of "commence construction," Order M-4 does not prohibit the continuation of such construction. The applicable dates by which work must have been done to qualify under the term "commence construction" are as follows:

List "A" construction prior to October 27, 1950.

List "B" construction prior to January 13, 1951.

List "C" construction prior to May 3, 1951.

N.P.A. has also issued Delegation 14, which assigns complete authority, in respect to certain specified types

of construction, to various official governmental agencies. Applications for construction authorization lying outside these construction types are submitted in the first instance to regional and district offices.

Manufacturers Directory

NATIONAL CRUSHED STONE ASSOCIATION recently announced the publication of the Manufacturers Division Directory, revised as of May, 1951. During the past two years, the directory has been published on a quarterly basis. However, as the revisions in such a short period of time are relatively few, it has been decided to issue the directory twice a year. The companies listed in the directory are associate members of the National Crushed Stone Association and the Agricultural Limestone Institute.

Limestone Plant

LOVE HOLLOW LIMESTONE CO., Batesville, Ark., a subsidiary of Batesville White Lime Co., has contracted with Aluminum Co. of America to furnish approximately 400,000 tons of high-calcium limestone annually for use in the new $55,000,000 alumina plant now under construction at Bauxite, Ark.

The company is building a new plant near Batesville in order to meet the production quota for the alumina plant. The limestone plant, to be built at a cost of approximately $1,000,000, is expected to begin operations not later than April 1, 1952, under contract terms. The Arkansas Power & Light Co. has agreed to build a $100,000 transmission line, and the Missouri Pacific Lines, a $50,000 spur track to the plant site. A request is now being made to the Arkansas Highway Commission for the construction of an 11-mile access road from the main highway at Batesville to the plant.

Kaiser Industries

APPEARING IN THE JULY, 1951, issue of *Fortune* were two studies of the Kaiser industrial empire, "The Arrival of Henry Kaiser" and its companion piece, "Kaiser-Fraser: 'The Roughest Thing We Ever Tackled.'" The article stated that no industrialist since Henry Ford has achieved so much in so short a time as Henry Kaiser. Kaiser-controlled companies were listed as including a sand and gravel business that has been netting around three-quarters of a million dollars a year; several construction organizations; Kaiser Steel Corp.; Kaiser Aluminum & Chemical Corp.; Kaiser Metal Products, Inc.; Kaiser Gypsum, a building-products division; Permanente Cement Co.; Kaiser Community Homes of Los Angeles; Kaiser-Frazer Automobile Company; Kaiser Engineers, a consulting firm; and a Kaiser-sponsored West Coast, non-profit health service and hospital system.

MANUFACTURERS NEWS

Cummins Engine Co., Inc., Columbus, Ind., announces that Robert E. Huthsteiner has been elected president of the company. Formerly executive vice-president, Mr. Huthsteiner succeeds J. Irwin Miller, who becomes chairman of the board. Clessie L. Cummins, founder of the company and formerly chairman of the board, has been named honorary board chairman. Mr. Huthsteiner has been with the company for almost 10 years, having come to Columbus from Chicago in 1942 to be sales manager. He was named controller in 1944 and elected a vice-president in 1946. He was elected a director for the first time in 1947 and also served successively as treasurer, general manager, and then executive vice-president for the last two years.

Robert E. Huthsteiner

Caterpillar Tractor Co., Peoria, Ill., has announced the election of Leonard J. Fletcher as vice-president and assistant to the president, L. B. Neumiller. He was formerly director of training and community relations. Ralph J. Morgan has been promoted from assistant to the president to executive assistant. Clyde L. Schwyhart has been promoted from assistant director of training to manager of the newly named education and training department; and Fred R. Jolly from assistant director of community relations to manager of the community relations department. The following promotions have been made in the general sales department: C. E. Jones, formerly manager of the sales development division, is now parts manager in charge of planning and development work for the parts department. George P. Fenn, former assistant manager of sales development, has been named manager of the division while Robert D. Evans, the division's supervisor of tractor and equipment operation, has been appointed assistant manager. John M. Abbey has been made assistant sales manager, industrial division, central sales division, and N. F. Sattem, district representative, has been named to succeed Mr. Abbey as assistant sales manager of the central division.

Lincoln Engineering Co., St. Louis, Mo., announces the appointment of John E. Renner as general sales manager. He will direct sales of the automotive, agricultural and industrial divisions.

Fairbanks, Morse & Co., Chicago, Ill., has announced construction of a new plant near Kansas City, Mo., for the manufacture of engines and pumps. Scale manufacturing operations at St. Johnsbury, Vt., and Moline,

Ill., are to be expanded, according to Robert H. Morse, Jr., president of the company.

John A. Roebling's Sons Co., Trenton, N. J., announces that John P. Kadlic has been appointed Philadelphia district sales manager for the wire rope division. He replaces Vincent L. Daulton, who lost his life in a recent train wreck. Mr. Kadlic was formerly sales representative in the St. Louis area.

Hyster Co., Portland, Ore., has appointed Graydon Broms as district representative for the territory covering most of Oregon, Washington, Idaho, western Montana, Yukon Territory, British Columbia and Alaska. Paul M. Fischer, Peoria factory manager for the past 11 years, has been named chief methods engineer with headquarters in Portland, Ore. W. H. Neptun, assistant factory manager, succeeds Mr. Fischer as Peoria factory manager.

Goodyear Tire & Rubber Co., Akron, Ohio, announces that Sheldon R. Harper has been placed in charge of sales promotion and advertising for the mechanical goods division, replacing R. W. Sabine, who has been promoted to manager of distributors sales for the division. Mr. Harper joined Goodyear Aircraft Corp. in 1940. He served in the U. S. Army Air Force from 1942 to 1946, then attended Ohio State University, graduating with a degree in journalism. He joined the squadron training program at Goodyear in 1950 and was transferred to the sales promotion department the same year.

Sheldon R. Harper

D. E. Harpfer, manager of mechanical goods design, was recently awarded a lapel pin for 25 years' service with the company, together with a cartoon-scroll signed by his friends and associates, and a leather billfold. He joined Goodyear in 1926 on staff training and entered mechanical goods design the same year. He was transferred to the Australian company in 1930, returning to the mechanical goods compounding department in Akron the following year. Mr. Harpfer was assigned to hose development in 1931 and was placed in charge of development of hose products in 1938. He has been manager of mechanical goods design since 1942.

General Electric Co., Schenectady, N. Y., announces that Harry L. Erlicher, vice-president, has been named special assistant to Under Secretary of the Army Archibald S. Alexander, where he will be in charge of Army procurement and production. He has been a part-time consultant on procurement matters for the Under Secretary since January, 1950.

Republic Rubber Division, Lee Rub-

ber & Tire Corp., Youngstown, Ohio, announces that James F. Dollison has joined the company as field engineer for northeastern Ohio and western New York, with headquarters in Youngstown.

DeLaval Steam Turbine Co., Trenton, N. J., announces that James P. Stewart, executive vice-president, has been elected president of the com-

INDUSTRY NEWS

Precast Concrete Wall Panels

THE MARIETTA CONCRETE CORP., Marietta, Ohio, recently began con-

1946. The severity rate and average severity were lowest in 1946, rising to a maximum in 1948 and, from this peak, declining somewhat in 1949.

Of the 57 companies reporting

CONCRETE PRODUCTS Co., Sioux City, Iowa, producer of "Soo-Crete" concrete block and related materials, recently converted to a Stearns 15 block machine to help meet increased demands for its products. Officers of the company include G. R. Batchellor, president, and Lyle Ballantyne, manager.

THE MEADER BROTHERS, Merle and , recently began operations at ir new ready-mixed concrete plant Rockford, Iowa.

OCK JOINT CONCRETE PIPE Co., t Orange, N. J., has announced ns for the construction of a branch nt, costing in excess of $1,000,000, Columbia, S. C. The new plant produce reinforced concrete pres- pipe in 16 ft. lengths, from 16 8 in. in diameter, primarily for southeastern section of the United es.

UDSON RIVER CONCRETE PRODUCTS, se concrete block plant at New imore, N. Y., was destroyed by last February, has formed a cor- tion under the same name and begun a rebuilding and expansion ram. The cost of building and ment will be approximately $75,- Gordon K. Fisher is president e new corporation and Mrs. Cath- P. Thorne is secretary.

XAS CONSTRUCTION MATERIAL CO. nnounced the removal of its home to 1919 Travis St., Houston, .

VTON CONCRETE PRODUCTS, New- an., began operations in June, and since that time has expand- ready-mixed concrete facili- y the addition of transit-mix and a larger batching plant. company has also installed ent for the production of con- block.

CONSIN CONCRETE PRODUCTS As- on has announced that its 32nd convention will be held at the nton House, Milwaukee, Wis., dnesday and Thursday, Janu- and 17, 1952. The banquet will on Wednesday evening.

KAKEE BLOCK CO., INC., recent- an operations at its new con- block plant at Kankakee, Ill. nstallations included a Stearns k machine, a 50-cu. ft. mixer, g batcher, bins, elevators, con- and handling and storage ent for aggregates and bulk Personnel of the company in- oy L. Reising, Wesley E. Reis- onald R. LaCost and Leland .

AND BANDFIELD, a newly company, recently began op- at its ready-mixed concrete Greene, Iowa.

OLSON CONCRETE Co., Toledo, Ohio, has announced the opening of a new plant in Rossford, Ohio, on the property formerly occupied by Rossford Brick and Tile Yard. The company stated it has large commitments for the Rossford Ordnance Depot. James A. Nicholson is president.

frequency rate was 58 and the injury severity rate was 2.25. The average time lost and charged per case (disabling injury) was 38.7 days. The indicated trend shows a continuing decrease in the frequency rate since

from either railroad cars or trucks, moved by conveyor belts to a bucket-type elevator and lifted to overhead bins. The plant will produce concrete masonry units, prefabricated roofing and flooring slabs, septic tanks, burial vaults and prestressed concrete.

ber & Tire Corp., Youngstown, Ohio, announces that James F. Dollison has joined the company as field engineer for northeastern Ohio and western New York, with headquarters in Youngstown.

DeLaval Steam Turbine Co., Trenton, N. J., announces that James P. Stewart, executive vice-president, has been elected president of the company. Wencel A. Neumann, Jr., formerly manager of the IMO-De Laval Products Division, has been named vice-president of industrial sales. H. G. Bauer has been elected vice-president of engineering, in addition to his duties as manager of marine sales, and Charles A. Jurgensen, works manager, has been elected vice-president of manufacturing.

The Wheelco Instruments Co., Chicago, Ill., has opened a new district agency, Engineering Products Co., in Charleston, W. Va., under the direction of F. E. Anderson.

GMC Truck & Coach Division, General Motors Corp., Pontiac, Mich., has announced the appointment of Thomas E. Wilson as production manager of the truck and coach division. He was formerly director of personnel and will be succeeded in this position by Earl A. Maxwell, who was supervisor of employment and salaried personnel relations. Charles Matson has been named general supervisor of material control for coaches and trucks. He was formerly supervisor of material and production control for the coach division.

INDUSTRY NEWS

Precast Concrete Wall Panels

THE MARIETTA CONCRETE CORP., Marietta, Ohio, recently began construction of a $150,000 plant in Marietta for the fabrication of insulated, precast concrete wall panels used in industrial curtain-wall construction, according to an announcement by F. L. Christy, president of the company.

The panels were developed for use as non-load bearing walls, and metal inserts cast into the slab enable the panel to be bolted directly to the steel framework of a building. It was stated that the use of these wall slabs will save as much as 40 percent of construction costs when used in place of ordinary masonry walls with the required insulation.

Insulated, precast concrete wall panels have metal inserts cast into slab for bolting directly to steel framework

The panels are 5 in. thick and are of laminated or sandwich construction. They are cast in steel forms by using an interior and exterior facing of concrete 1¾ in. thick, separated by 1½ in. of rigid insulation which forms the core. They are cast on muslin to provide a decorative, textured interior surface. The standard size of each slab is 8 x 10 ft.; other sizes are available on order.

The Marietta Concrete Corp. also produces concrete silo storage systems, Beslite (a lightweight aggregate) and other precast and structural concrete products. Main offices of the company are in Marietta, Ohio, where the firm also maintains five plants. Two plants are located in Baltimore, Md., and a branch office in Charlotte, N. C.

N.C.M.A. Accident Rates

NATIONAL CONCRETE MASONRY ASSOCIATION has reported an apparent improvement in the accident experience in 1949, over that of 1948, according to reports submitted from 57 N.C.M.A. member plants.

A total of 202 disabling injuries, resulting in 7823 days of lost time, occurred in these plants. Considering all occupational groups, the injury frequency rate was 58 and the injury severity rate was 2.25. The average time lost and charged per case (disabling injury) was 38.7 days. The indicated trend shows a continuing decrease in the frequency rate since 1946. The severity rate and average severity were lowest in 1946, rising to a maximum in 1948 and, from this peak, declining somewhat in 1949.

Of the 57 companies reporting, 16 operated for the entire year without a single lost-time accident, and six of these companies also had a perfect record in 1948.

Buys Quarry

MAULE INDUSTRIES, INC., Miami, Fla., recently purchased the Broward Quarries near Fort Lauderdale, Fla., from Tri-State Asphalt Co., Martin's Ferry, W. Va. New machinery will be installed at the Broward plant for the production of concrete block and ready-mixed concrete. The Broward Quarries produce rock and sand of various grades. C. F. Dean, who was general superintendent of the plant under Tri-State Asphalt Co., will remain in charge of operations.

Repurchases Company

H. E. STICE, founder of Colorado Pre-Mix Concrete Co., Denver, Colo., recently repurchased the company at a price of approximately $775,000. Mr. Stice sold the company last May and planned to retire, but he then changed his mind about retirement. He also announced that he and his sons, M. H., Stanley E. and Maurice P. Stice, had acquired controlling interest in the new Central-Mix Concrete Co., Denver, Colo., now under construction.

Cover Picture

COVER PICTURE on this issue shows the entrance lobby of the Portland Cement Association's newly remodeled headquarters building. Masonry walls are laid in a basket weave pattern and contrast nicely with the cast stone columns. The floor is terrazzo of alternate terra-cotta and deep green squares. The receptionist's desk is of cast stone, with grey and green aggregate chips predominating. The walls are light green.

Concrete Products Plant

KATTERJOHN CONCRETE PRODUCTS has begun partial operations at its new plant at North Little Rock, Ky., although the building has not yet been completed. A new machine capable of producing 15 concrete brick per minute has been installed, and two similar machines are to be installed in the near future. Concrete floors have been completed, and a large concrete tunnel running under a 615-ft. Missouri Pacific spur track has been built. Raw materials will be dumped from hopper cars directly into the tunnel, from either railroad cars or trucks, moved by conveyor belts to a bucket-type elevator and lifted to overhead bins. The plant will produce concrete masonry units, prefabricated roofing and flooring slabs, septic tanks, burial vaults and prestressed concrete.

CONCRETE PRODUCTS CO., Sioux City, Iowa, producer of "Soo-Crete" concrete block and related materials, recently converted to a Stearns 15 block machine to help meet increased demands for its products. Officers of the company include G. R. Batchellor, president, and Lyle Ballantyne, manager.

THE MEADER BROTHERS, Merle and Lee, recently began operations at their new ready-mixed concrete plant at Rockford, Iowa.

LOCK JOINT CONCRETE PIPE CO., East Orange, N. J., has announced plans for the construction of a branch plant, costing in excess of $1,000,000, in Columbia, S. C. The new plant will produce reinforced concrete pressure pipe in 16 ft. lengths, from 16 to 48 in. in diameter, primarily for the southeastern section of the United States.

HUDSON RIVER CONCRETE PRODUCTS, whose concrete block plant at New Baltimore, N. Y., was destroyed by fire last February, has formed a corporation under the same name and has begun a rebuilding and expansion program. The cost of building and equipment will be approximately $75,000. Gordon K. Fisher is president of the new corporation and Mrs. Catherine P. Thorne is secretary.

TEXAS CONSTRUCTION MATERIAL CO. has announced the removal of its home office to 1919 Travis St., Houston, Texas.

NEWTON CONCRETE PRODUCTS, Newton, Kan., began operations in June, 1950, and since that time has expanded its ready-mixed concrete facilities by the addition of transit-mix trucks and a larger batching plant. The company has also installed equipment for the production of concrete block.

WISCONSIN CONCRETE PRODUCTS Association has announced that its 32nd annual convention will be held at the Plankinton House, Milwaukee, Wis., on Wednesday and Thursday, January 16 and 17, 1952. The banquet will be held on Wednesday evening.

KANKAKEE BLOCK CO., INC., recently began operations at its new concrete block plant at Kankakee, Ill. Plant installations included a Stearns 15 block machine, a 50-cu. ft. mixer, weighing batcher, bins, elevators, conveyors and handling and storage equipment for aggregates and bulk cement. Personnel of the company include Roy L. Reising, Wesley E. Reising, Donald R. LaCost and Leland Bowers.

SWAB AND BANDFIELD, a newly formed company, recently began operations at its ready-mixed concrete plant in Greene, Iowa.

NICHOLSON CONCRETE CO., Toledo, Ohio, has announced the opening of a new plant in Rossford, Ohio, on the property formerly occupied by Rossford Brick and Tile Yard. The company stated it has large commitments for the Rossford Ordnance Depot. James A. Nicholson is president.

NO-TURN shuttle haul

Dump

On every haul cycle, Koehring
eliminate slow turns — at the lo
ing point, on sharp, "zig-zag"
productive haul time, because
transmission gives the same 3
reverse. Here's how much n
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It will pay you to get complete facts from your Koehring distributor. Call him NOW

PAG

MISS

Ackerman Concrete Products Co., Hillsdale, N. J., uses vermiculite aggre-

o. yard at Hillsdale, N. J. Note rack-side truck with plank

GES

SING

'RETE PLANKS

case oil and kerosene which is brushed on. Mr. Ackerman said that, after a great deal of experimenting, he has found this the most satisfactory of all the partings he has tried.

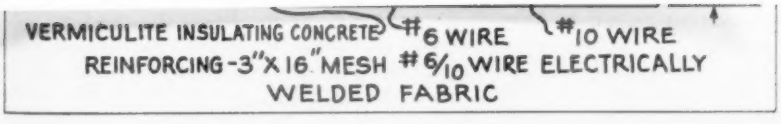
After the planks are taken from the mold, they are stacked outside to cure. An electric hoist picks up and moves six planks at a time in a basket. This equipment resembles the load-binders used to handle lumber. It is also employed for loading trucks. Delivery is made either in rack-side trucks or by freight, and there has been very little breakage either in transit or on the job.

Plank Applications

Planks have been shipped to other parts of New Jersey, to New York, Delaware, Pennsylvania, North Carolina, and as far away as Georgia. They have been used for roofing several large local buildings where the area was over 100,000 sq. ft. A 1:4 mix of vermiculite concrete is used to grout the planks together and provide a seal against leaking pitch from the built-up roofing. In a Pennsylvania motel, 300 ft. long, the plank was used not only for the roof, but for partitions, as well. The plank is becoming very popular for small buildings also, such as factory and commercial structures, theaters, and garages. It is now specified for the roofs of all new Gulf Oil service stations in a number of Eastern states.

U. U. Robbins, secretary of the firm, built the first home in which the plank was used for side-walls, partitions and roof. This is a six-room dwelling that has proved so satisfactory and economical to build that the plank has been approved by the Building Department of nearby Hackensack, N. J., for home construction. About a dozen houses of this kind have since gone up. For side-

(Continued on page 140)



Cross section drawing of insulated concrete plank

NO-TURN shuttle haul

Dumptors®

SAVE TURN TIME GAIN HAUL TIME

On every haul cycle, Koehring fast-shuttling Dumptors eliminate slow turns — at the loading unit, at the dumping point, on sharp, "zig-zag" grades. They gain more productive haul time, because Koehring constant-mesh transmission gives the same 3 fast speeds forward and reverse. Here's how much no-turn shuttle operation can increase your production:

By eliminating only 2 turns on a 1,000' haul, time studies prove that Dumptors can save 30 seconds every round trip, and increase hourly yardage output over 10% per unit. What's more — fast, easy spotting and 1-second gravity dump keep production high.

Remember, too — top hauling efficiency also means increased shovel output. For *double profit protection*, team fast-shuttling Dumptors with Koehring heavy-duty excavators. Four sizes: ½-yd., ¾-yd., 1½-yd., and 2½-yd.

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Subsidiaries: JOHNSON • PARSONS • KWIK-MIX

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Ackerman Concrete Products Co., Hillsdale, N. J., uses vermiculite aggregate for panels which find acceptance for roof and wall construction

A portion of the Ackerman Concrete Products Co. yard at Hillsdale, N. J. Note rack-side truck being loaded with plank

PRECAST LIGHTWEIGHT CONCRETE PLANKS

CAPITALIZING ON THE demand for insulation in structural design, Paul Ackerman, president of Ackerman Concrete Products Co., Hillsdale, N. J., has developed a precast vermiculite insulating concrete plank that is approved for roof construction by the New York Board of Standards and Appeals in all five boroughs. The plank may also be used for floors, exterior walls and interior partitions. Structural strength, insulation and fireproofing are all supplied in this one unit. The "K" factor, Mr. Ackerman said, is 0.826. Another advantage is ease of installation, for the plank can be installed quickly.

Tests have proved it strong enough to carry about ten times the load of normal occupancy before breaking, and about four times the normal deflection load. The planks tested were not cast especially for that purpose. They were taken at random from a batch produced for a job in the regular course of operation.

There are no stock sizes. Planks are made on order to fit each steel layout. They run about 3 in. thick, up to 12 in. wide and up to 7 ft. long. All end joints are centered on the flange of the supporting I-beams or channels, and are marked according to the plank layout. They are cast with V-edges to insure more attractive joints when exposed on the ceiling.

Reinforcing

The concrete consists of one part portland cement, four parts vermiculite concrete aggregate, and two parts cinders. Reinforcing is No. 6 wire longitudinals and No. 10 cross wires made up in 3- x 16-in. mesh. Wires are electrically welded and then crimped in a special machine that accurately bends the cross wires to put the longitudinal bars alternately in the top and bottom. Reinforcing the top, as well as the bottom, of the plank also helps to avoid shrinkage cracks in the top portion; and if the plank should be handled upside down on the job, the top reinforcing is there to take care of such handling stresses.

The plank is poured in two stages. The steel mold is filled half full of concrete, the reinforcing is placed, and the second pour is added. The plank remains in the mold for 20 hr. Planks are poured two at a time; as the form is filled, a steel plate is placed over it and another form is set on top.

Mr. Ackerman designed the crimping machine and the molds. The latter are greased with a mixture of crankcase oil and kerosene which is brushed on. Mr. Ackerman said that, after a great deal of experimenting, he has found this the most satisfactory of all the partings he has tried.

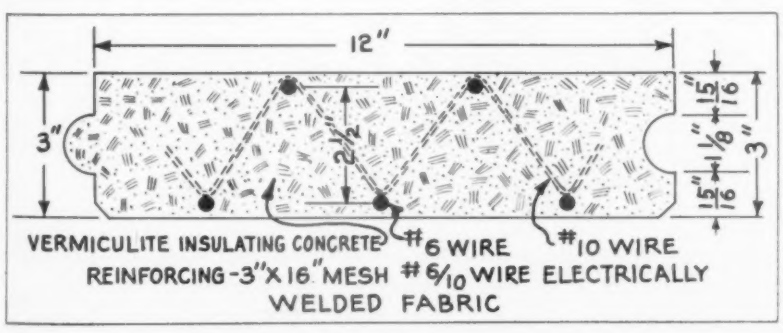
After the planks are taken from the mold, they are stacked outside to cure. An electric hoist picks up and moves six planks at a time in a basket. This equipment resembles the load-binders used to handle lumber. It is also employed for loading trucks. Delivery is made either in rack-side trucks or by freight, and there has been very little breakage either in transit or on the job.

Plank Applications

Planks have been shipped to other parts of New Jersey, to New York, Delaware, Pennsylvania, North Carolina, and as far away as Georgia. They have been used for roofing several large local buildings where the area was over 100,000 sq. ft. A 1:4 mix of vermiculite concrete is used to grout the planks together and provide a seal against leaking pitch from the built-up roofing. In a Pennsylvania motel, 300 ft. long, the plank was used not only for the roof, but for partitions, as well. The plank is becoming very popular for small buildings also, such as factory and commercial structures, theaters, and garages. It is now specified for the roofs of all new Gulf Oil service stations in a number of Eastern states.

U. U. Robbins, secretary of the firm, built the first home in which the plank was used for side-walls, partitions and roof. This is a six-room dwelling that has proved so satisfactory and economical to build that the plank has been approved by the Building Department of nearby Hackensack, N. J., for home construction. About a dozen houses of this kind have since gone up. For side-

(Continued on page 140)



Cross section drawing of insulated concrete plank

Comparative Shrinkage Data for Heavy and Lightweight Concrete Units

By PAUL C. NESS*

THE FOLLOWING STUDIES of the shrinkage occurring in cinder and sand and gravel concrete masonry units were made by the author while a student at South Dakota School of Mines and Technology, Rapid City, S. D. The report was written for a seminar, and was the result of research on concrete block made by The Dakota Lime and Brick Co., Rapid City. The methods presented here can be applied by many small producers who do not regularly have their units tested.

Part I. Investigation of Shrinkage in Cinder Block

The composition of the cinder block investigated was as follows: 20 gal. of water, seven bags of cement, 2400 lb. of cinders, and 600 lb. of gravel. This combination is equivalent to a water-cement ratio of about 1 to 2½ and constitutes one batch. The block used for this experiment were taken from several batches.

Method of Curing

All block were cured in a kiln for 14½ hr. as follows: from 5 p.m. to 2 a.m. the temperature was gradually increased from 60-160 deg. F. by the injection of live steam causing a relative humidity of 100 percent; from 2 a.m. to 7:30 a.m. the temperature was held at 160 deg. F., at which time the block were placed under two different curing conditions. These conditions will be stated later.

In this experiment, 13 block were used. They were divided into three series—A, B and C—with four, five and four block in each series respectively. Upon removal from the kiln, series A was placed in a room with a constant temperature of about 70 deg. F. and with a relative humidity that was assumed to remain constant. Series B and C were placed on a concrete slab out-of-doors completely exposed to the elements. Eighteen days later, series B was placed under the same conditions as A while C remained outside until the completion of the experiment.

Method of Testing

Immediately after the block were made, two nails with punched and reamed holes in the heads were placed in the sides of each block as nearly 8 in. apart as possible. The Berry strain gauge and Ames dial were used to measure the deformation, the accuracy being about 0.0002 in. Because the change in length was the important feature, the exact initial length was not given special consideration.

Shrinkage

Shrinkage in concrete block may be considered as caused by the drying out of the block. The rate of shrinkage varies inversely as the humidity of the air, that is, the drier the air the more shrinkage. Fig. 1 shows what effect the relative humidity and temperature had on the cinder block of series B and C during a period of 30 days. As the temperature increased, there was a corresponding increase in the length of the block; as the temperature decreased, there was a corresponding decrease in the length of the block. The only effect the relative humidity had was to tend to make the shrinkage follow a smooth curve. Since a low relative humidity allows more shrinkage than a higher one, it follows that as the temperature increases, the block length increases; as the temperature increases, however, the relative humidity decreases and tends to cause the block to shrink.

Fig. 1 also shows that block cured under different humidity and temperature conditions do not shrink the same amount in the same length of time. The reason for this difference is the rate of chemical action that takes place during setting. Setting is the chemical union of water with cement which causes the block to harden completely, but most of the set is accomplished in the first month under favorable conditions.

Since setting is dependent on time, temperature, and relative humidity, a block cured under relatively dry, constant-humidity conditions, and 70 deg. F. temperature, would lose a large percentage of moisture, shrink considerably, and set quite solidly in the first month. The block of series A were placed under these conditions and followed a comparatively smooth curve for 90 days.

The block of series B and C, however, were under conditions of varying relative humidity and temperature. Since the temperature was below freezing most of the time for the first month, and since the relative humidity was higher than it was for the block of series A, not as much moisture escaped. Because moisture was retained in the block, they did not shrink as much. Also, because the temperature was lower, the hardening process did not progress as rapidly and allowed more of a variation from a smooth curve after the first month.

Although the block of series B and C will shrink more, they will never shrink enough to interseet the curve of series A.

Interpretation of Results

Fig. 1 shows the total shrinkage of the block in series A as 0.0275 in. in 8 in., which is a decrease in length of about 0.0034 in. per in.

The following calculations may be used to determine the length of time a block should cure before going into the construction of a building:

Size of block ....5⅝ x 15⅝ x 7⅝ in.
Average compressive stress (28 days) .....1200 p.s.i.
Effective area .....53.5 sq. in.
Modulus of elasticity (E) .....1,200,000 p.s.i.
Ratio of S_t/S_e .....⅛

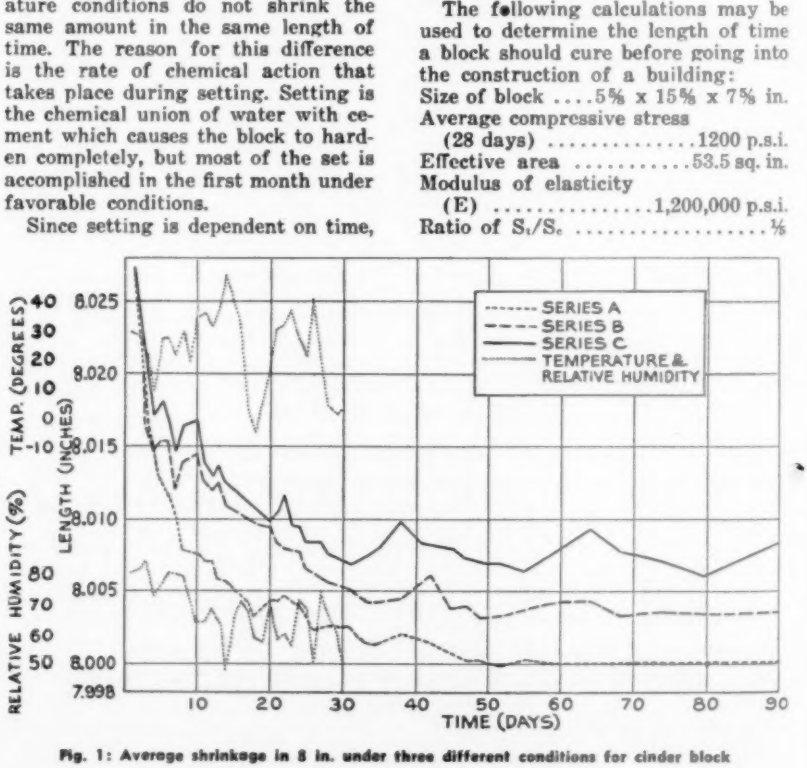


Fig. 1: Average shrinkage in 8 in. under three different conditions for cinder block

*South Dakota School of Mines and Technology, Rapid City S. D.

S_t .....240 p.s.i.
Factor of safety 2
Allowable unit deformation
not to exceed S_t of 120
p.s.i. = S_t/E
=120/1,200,000 ....0.0001 in./in.
Allowable deformation in 8 in.
= 0.0008
where S_t = tensile strength
and S_c = compressive strength.

Therefore, assuming that all the shrinkage has taken place in 90 days, following the graph from 90 days toward zero days along the abscissa and increasing the ordinate by 0.0008, one can see that the graph of series A intersects the increase at about 30 days. Following series B and C in the same manner gives approximately the same results. This means that no matter what the atmospheric conditions may be, dry curing of block should continue for at least 30 days before any go into the construction of a building.

Part II. Investigation of Shrinkage in Sand and Gravel Block

The composition of the sand and gravel block investigated was as follows: 15 gal. of water, seven bags of cement, 2800 lb. sand, 2200 lb. gravel and 3½ lb. of Pozzolith. These proportions are equivalent to a water-cement ratio of about 1:3½ and constitute one batch. The material used in the block for this experiment was taken from several batches.

Method of Curing

The sand and gravel block were cured in a kiln as were the cinder block. There were 14 block used, and they were divided into three series—A, B and C—with five, four and four block in each series, respectively. Upon removal from the kiln, series A was placed in a room with a constant temperature of about 70 deg. F. and with a relative humidity that was assumed to remain constant. Series B and C were placed on a concrete slab completely exposed to the weather. Forty days later, series B was placed under the same conditions as series A while C remained outside until the completion of the experiment.

Method of Testing

The method of testing was the same as that used for the cinder block, that is, with punched nails and the Berry strain gauge.

Shrinkage

Shrinkage in sand and gravel block may be considered caused by the drying out of the block, as in the case of cinder block. Fig. 2 reflects what effect the relative humidity and temperature had on the block of series B and C during a period of 30 days. Fig. 2 also indicates that block cured under different humidity and temperature conditions do not shrink the same amount in the same length of time. The reason for this difference has been explained in the discussion of cinder block.

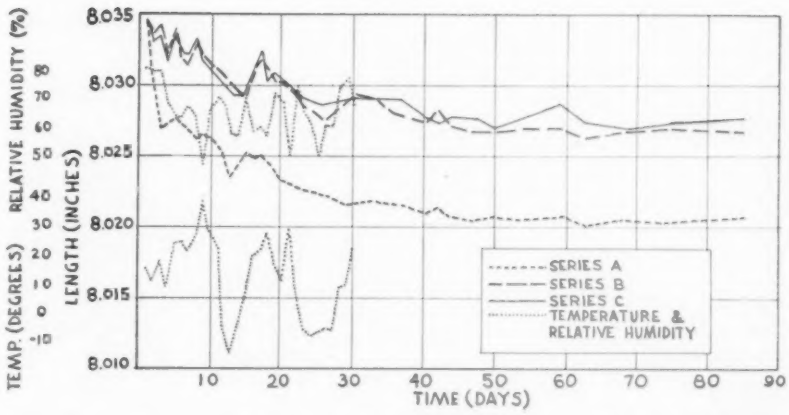


Fig. 2: Average shrinkage in 8 in. under three different conditions for sand and gravel block

Interpretation of Results

Fig. 2 shows the total shrinkage of the block in series A to be 0.0138 in. in 8 in., which is a decrease in length of about 0.0017 in. per in. This decrease is only half as much as it was for the cinder block under the same curing conditions.

The following calculations may be used to determine the length of time a block should cure before going into the construction of a building:
Size of block ....7⅝ x 7⅝ x 15⅝ in.
Effective area .....80 sq. in.
Average compressive stress
(28 days) .....2000 p.s.i.
Modulus of elasticity
(E) .....2,000,000 p.s.i.
Ratio of S_t/S_c .....⅛
S_t .....400 p.s.i.
Factor of safety 2
Allowable unit deformation
not to exceed S_t of 200
p.s.i. = S_t/E
= 200/2,000,000 .....0.0001 in./in.
Allowable deformation in 8 in.
= 0.0008
where S_t = tensile strength and S_c = compressive strength.

Therefore, assuming that all the shrinkage has taken place in 90 days, following the graph from 90 days toward zero days along the abscissa and increasing the ordinate by 0.0008, one can see that the graph of series A intersects the increase at about 30 days. Following series B and C in the same manner gives approximately the same results.

This means that no matter what the atmospheric conditions may be, dry curing of block should continue for at least 30 days before they can be ready for use.

Comparison of Cinder and Sand and Gravel Block

The results obtained indicate that cinder block shrink about twice as much as sand and gravel block. This means that if a cinder block was put into a building 15 days after it was made, it would produce a crack twice as large as a sand and gravel block put into a building after the same period of curing. The reason that the two types of block have different shrinkage rates is probably because the cinder block are more porous.

Conclusions and Recommendations

Block cured in air do shrink and their rate of shrinkage is inversely dependent upon the relative humidity.

Since shrinkage is caused by the loss of moisture, cinder block (because of their greater porosity and ability to lose moisture) shrink more than sand and gravel block.

Also, because most of the hardening has taken place in about the first 30 days, and because the tensile strength of the material in the different block is not exceeded after this period, it is recommended that block be kept in the yards for at least 30 days.

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"Clapboard" Block

ZONOLITE Co., Chicago, Ill., has announced the development of a construction method combining an attractive "clapboard" appearance for a home, with the permanence and durability of concrete. This unique construction has been achieved with the introduction of "Burchard" block. The block is made on inside and outside shells of solid concrete, held in position by steel rods embedded in the concrete. The face of the outer shell has a half-inch bevel which produces the clapboard appearance. Both shells are tongued and grooved to assure correct alignment when placed in the wall.

The block, measuring 8 x 8 x 16 in., is filled with fireproof, nonsettling vermiculite, and according to the company, is equal in insulating value to 10 thicknesses of 1-in. boards and will cost less than any other construction affording equal insulation, and in addition, it will have the permanence and durability of concrete.

Furnaces used in new system of steam generation are in back of each kiln

Superior Concrete Products Co., Augusta, Ga., has built new plant incorporating individual steam generators for each kiln

PLANT USES EFFECTIVE CURING SYSTEM

WHEN THE ATOMIC ENERGY Commission announced that almost a billion dollars was to be spent on a new H-bomb development just across the Savannah river from Augusta, Ga., that sleepy old river town awoke with a start to find hordes of people rushing to take part in the great construction program necessary. The impact these projects have on the rock products and concrete products industries echoes to areas well north of the Mason-Dixon line, for the work in the initial stages will call for large volumes of aggregates and concrete products of all kinds. Rumors are plentiful of northern companies moving into the construction zone and in a radius of a hundred miles or so several old time Southern rock producers are moving rapidly, expanding and building new plants so as to be the first on the job.

The company that was the first to be on the job and to get a new plant running is Superior Concrete Products. The heads of this company are all men familiar with concrete masonry production, for they have other plants in the Southeast. Paul L. Barnes is president of Superior Concrete Products Co., L. J. Badgett is secretary and treasurer, and James N. Maples is vice-president and general manager. Mr. Barnes is also president of the North Carolina Concrete Masonry Association and operates a plant in Winston-Salem, N. C. Mr. Badgett is a past-president of the same association, and has a plant at Mt. Airy, N. C. Mr. Maples is a civil engineer with long contacts with the portland cement and construction industries in the South.

Superior Concrete Products Co. put its new plant into operation in mid-April. The plant is located on a 20-acre site at East Boundary and the Charleston & Western Carolina Railroad near the east edge of the town of Augusta, Ga. The initial operation consists of a three-block Lith-I-Bar block machine installed so that the present weigh batcher can be used for another machine of similar type now being installed alongside it. The company plans to make a wide variety of concrete products. It is most emphatic on this point, for the management is looking ahead to the day when the lush construction period will be over and Augusta and adjacent areas will have settled down to a normal existence. Not too far away from the new concrete masonry plant is a large brick manufacturing company. The officers of Superior Concrete Products Co. are keenly aware of the competitive picture thus presented.

General view of Superior Concrete Products Co. plant at Augusta, Ga. At right can be seen the kilns with individual furnaces

Curing System

The curing system used at Superior is one of the first encountered that uses the Lith-I-Bar curing method. There are at present five kilns that can hold a total of about 9000 standard 8's. In each kiln is an individual curing unit which consists of a small oil burner, the flame of which burns inside a small combustion tube of a special heat-resisting metal. The fire box is outside and to the rear of each kiln. The burner tube extends into the kiln. This tube is about 9 in. in diameter and about 3 ft. long. When no water is used in normal operation, the tube is heated to a dull red color. Small water sprays are directed onto the outside of it, thus generating the steam. The sides and lower section of the assembly around the tube are enclosed in a metal housing; the top is open. The sprays deliver about 30 gal.

of water per hour. A small fan is a part of each oil burner unit.

Curing Cycle

The curing cycle is as follows: after the kiln is full and the doors tightly closed, the oil burner starts and continues to supply low pressure steam to the kiln for any desired length of time. At the expiration of the preset steaming time, the water automatically is cut off and hot dry air is blown into the kiln from the same burner. The length of drying time is also preset. At the end of that period the oil flame goes out, and the fan then functions to pull the hot air out of the kiln and dry out the block, in addition making it cooler inside for the men working there. Each fire box and assembly has its own timing device, and once the curing and drying periods have been established each unit operates automatically. Each fire box is about 3 x 3 x 3 ft. and is of sheet metal construction which can be insulated on the job. The units appear to be relatively inexpensive curing devices. An 8000-gal. oil storage tank feeds the burners by gravity.

As the units had only been in operation a matter of days at the time of inspection, the amount of oil used has not been accurately determined, but it appears to be small. Nor has the curing, drying and cooling time been established. However, tests are being run under the direction of J. P. Jones, Jr., production manager, to determine optimum curing conditions.

Kiln Construction

The roofs of the kilns are Dox block from the plant of Knoxville Concrete Products Co., Knoxville, Tenn.

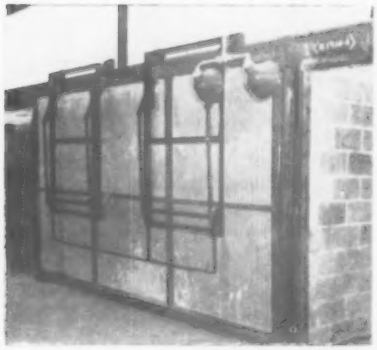
The doors to the kilns are a slightly different type than those in many plants. A door is carried by a special "door-carrier" that rides a trolley in front of the kilns. The carrier picks up a door and places it over the kiln's open end, after which the operator puts it into place. The door is held in place by lugs that make a tight seal. Gaskets can be used. As can be seen from the photographs, there are two carriers for the five doors. They were made by Universal Door Carrier Corp., Indianapolis, Ind.

The batching equipment comprises a four-compartment steel bin and storage and unloading facilities for bulk cement. Fanning-Schuett bins are used with Spinks (Atlanta, Ga.) scales. A small Jaeger compressor supplies air for the Lith-I-Bar machine and a Jacuzzi Bros., Inc. (Richmond, Calif.) deep well pump provides an adequate water supply.

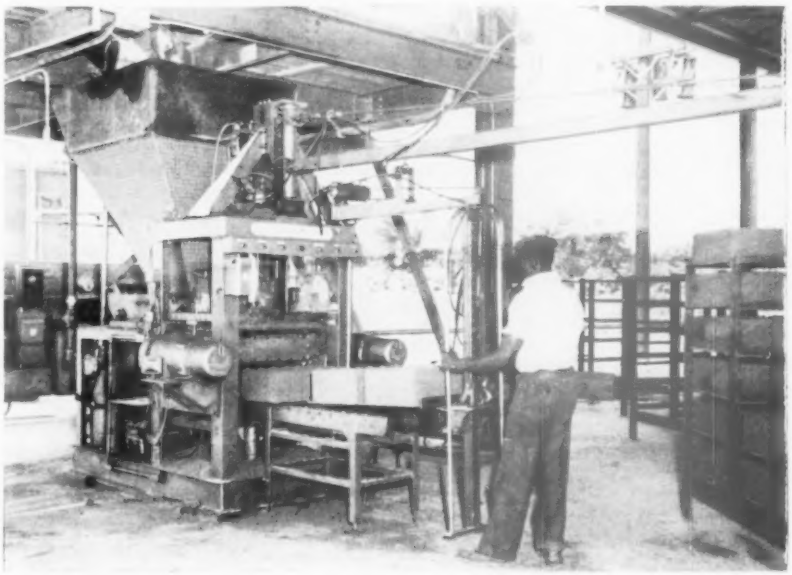
Facilities are available so that aggregates can be delivered to the new plant by truck or by rail. A Northwest clamshell is used for unloading open top cars or to reclaim from ground storage. Fine and coarse aggregates are delivered to the bins by an inclined belt conveyor. Two Clark lift trucks operate in and about the yard, and those areas now in use are paved.

The company at the present is making block from hard aggregates and cinders, but expects very soon to be using another lightweight material. The hard aggregate is local sand, gravel and granite screenings.

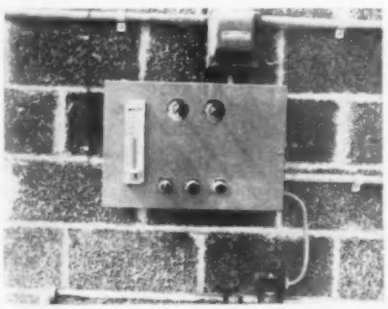
Odd sized block are cubed on wooden pallets for handling by fork lift truck



Aluminum doors moved on carriers are used on the kilns



Block machine in operation producing three standard 8- x 8- x 16-in. units per cycle



Controls for governing the curing cycle are located on the end of each kiln

This is the "hot" end of furnace inside the kiln; water is sprayed on tube in center

Outside view of one of the furnaces. Individual kiln controls are visible

PRODUCT IMPROVEMENT KEYNOTE OF CINDER BLOCK PRODUCERS CONVENTION

Producers discuss supply situation, methods of treating inferior cinders and ways to reduce shrinkage of masonry units

THE DUAL SUBJECT of how to improve further the qualities of cinder block and what to do about a growing shortage of cinder aggregate dominated the twenty-eighth annual meeting of the National Cinder Concrete Products Association in Boston, August 6-8. This group is affiliated with the National Concrete Masonry Association. At the same time and place members of the New England Concrete Masonry Association met separately to discuss an economical means of producing lightweight aggregates artificially. Seventy men from 15 states attended the national meeting. Many were accompanied by their wives who attended the luncheon sessions the first two days of the meeting.

The social side of the convention included a cocktail party given by the New England association, three bus tours of historical spots in Boston for the wives of the visitors and a special bus tour arranged for both men and women. All business sessions were held at the Statler Hotel.

Belief that a shortage of good quality cinders will become increasingly critical and that other types of lightweight aggregates, either natural or artificial, will have to be found, was unanimous among the manufacturers in attendance. This growing shortage is due to the fact that more and more power plants and factories are utilizing gas or oil as fuel.

The opening session on Monday, August 6, was called to order by Harry H. Longenecker, executive secretary, acting as chairman. An address of welcome was made by Jack Freedman, chairman of the Boston committee in charge of arrangements, who is president of Massachusetts Cement Block Co., Medford, Mass.

"We are happy to welcome you here in Boston," Mr. Freedman said. "Our streets may be narrow, but our minds are broad. Our streets may be crooked but our thinking is straight. We know that our climate, while harsh in the winter, is most beneficent in the summer and we New Englanders who welcome you hope that you will be able to enjoy, in Boston, our weather and our historical heritage and to appreciate our indomitable courage. If the weather does not suit, do not be discouraged, for in New England the weather changes every minute.

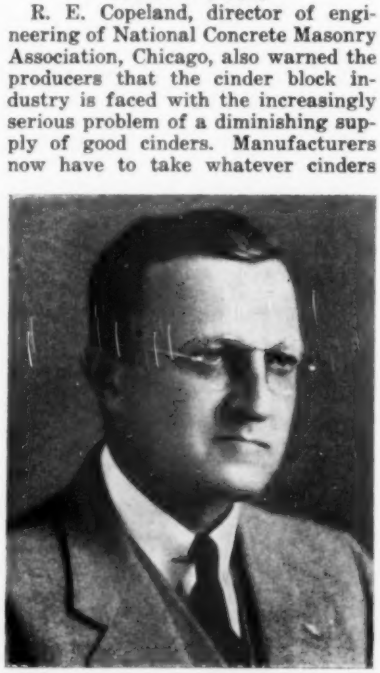
"Fortunately our welcome to you is constant and does not depend upon the weather. We hope that while you are our guests here, you will be able to enjoy the hospitality of our people and that when you leave you will do so with regret. And we trust that before long you will wish of your own volition to come back to the fount of Americanism."

Mr. Freedman introduced Walter M. Burse, secretary of the New England Concrete Masonry Association, who is also president of Suffolk University. Mr. Burse praised the harmony in which he said New England concrete masonry men work, declaring that they have no trade secrets and are more interested in helping the whole industry than in exploiting secret processes.

Mr. Burse said he was especially interested in watching legislation adverse to the concrete block industry which is constantly coming up. He warned the block men against what he termed "shakedown" legislation aimed at prohibiting or restricting the use of cinder block. Such legislation, he said, had been introduced repeatedly in the Massachusetts legislature but had failed to pass up to this time. Recently, he said, labor unions in the building trades had expressed strong opposition to such bills.

Cinder Supply

R. E. Copeland, director of engineering of National Concrete Masonry Association, Chicago, also warned the producers that the cinder block industry is faced with the increasingly serious problem of a diminishing supply of good cinders. Manufacturers now have to take whatever cinders they can get from whatever source, he said. He pointed out that this introduces the problem of how to blend cinder aggregates and doesn't help the problems of popping and staining. Mr. Copeland referred to the use of milk of lime to minimize staining and to improve the quality of cinder aggregates. He said that popping can be minimized by long moist storage of cinders. Although this is difficult for some plants because of the space required, he said it was sufficiently important to be included in all plant improvement programs.



Harry H. Longenecker, executive secretary

Mr. Copeland said he regarded cinders as an excellent aggregate giving rise to few complaints, but warned that if the scarcity trend continues producers will be compelled to turn to some other type of aggregate. He pointed out that this might involve providing local means to manufacture such an aggregate. In the meantime he said block producers should continue to utilize cinders as long as they are available and to treat them in various approved ways to avoid trouble in the wall.

Technical Problems

Cracking in concrete masonry is a foremost problem in the minds of producers, Mr. Copeland said. He described in some detail the work done by the Portland Cement Association in constructing its new research and development laboratory and remodeling its general office building in Chicago. On these projects, he said, the contractors dried the concrete masonry units with portable heaters before they were put into the walls. He expressed the belief that complaints of cracking would be minimized if proper care were taken in drying out concrete masonry units. He said means of drying could be applied to stockpiles in the manufacturers' yards or units could be put through drying ovens.

The matter of grading of concrete aggregates is a problem common to all segments of the concrete masonry industry, Mr. Copeland said. Control of grading is important, he pointed out. Although screening may be difficult, especially with wet materials, the problem of grading should have the best attention of every manufacturer, the speaker declared. Selection of types and mesh sizes of screens, he said, should have careful consideration. He pointed out that where aggregates are separated into two or

three sizes there is likely to be more uniformity in the block.

Asked from the floor whether any conclusive study has been made of the relation of size of aggregates to the quality of cinder block, Mr. Copeland said that tests indicate that varying the size of aggregates has very little effect on shrinkage of block.

In answer to another question from the floor, Mr. Copeland said that drying block thoroughly before it is used is the best way to reduce shrinkage. He said that drying shrinkage is a major problem and that there is some scientific evidence that the older the concrete the less will be the shrinkage resulting from rewetting.

A member from the floor suggested that contractors should be required to protect block on the job from wetting in rainy weather and asked Mr. Copeland to comment. In answer, Mr. Copeland urged the cooperation of both contractors and architects in protecting block from wetting and suggested that architects' specifications should cover this point as is done on U. S. Army construction jobs. In this connection Mr. Copeland described a procedure used by A. G. Streblow of Basalt Rock Co., Napa, Calif., in waterproofing block by dipping in a waterproofing solution. This is done to prevent reabsorption of moisture in yard stockpiles and on the sites of construction jobs. He said that this method was used on block for one large housing project in California and that no cracking of block was observed after a considerable period of service. (See ROCK PRODUCTS, January, 1950, page 201, for a more complete description of the Basalt waterproofing method.)

In reference to U. S. Army jobs, Mr. Copeland pointed out that the Army requires dryness to not more than 30 percent of absorption and present A.S.T.M. specifications to not more than 40 percent. He told the producers that a practical device to measure the moisture content of concrete block has been developed by C. A. Menzel of the Portland Cement Association.

The discussion of cracking led to a lively interchange of opinions from the floor, many members relating their own experiences on various kinds of construction projects with cinder block. As one means of minimizing cracking, Mr. Copeland suggested that control joints should be provided in any masonry wall more than 50 ft. long.

A high spot of the opening session was a paper based on researches reported by manufacturers using high pressure steam curing and other systems. This was presented by C. H. Carmichael of I. L. Stiles & Son Brick Co., North Haven, Conn., and led to an animated exchange of experiences on the floor.

Jerome Modell of A. C. Horn, Inc., sparked a lively discussion of air entraining in the light of present shrinkage problems. He told the producers that he believed air-entraining cement would control cracking of block. He contended that the amount of water in a concrete mixture can be reduced as much as 15 percent without injuring the texture of the block and with the added advantage of reducing shrinkage. He also claimed that this procedure would give increased strength.

During the luncheon which followed the first day's session, it was announced that the men would visit the plant of Massachusetts Cement Block Co. at Medford during the afternoon, while the ladies would make a bus tour of some of the historic points around Boston.

Jack Freedman, president of Massachusetts Cement Block Co., was host to the 40 men who filled a bus provided for the trip to his plant, said to be the largest producer of concrete block in the state. With three Besser Vibrapacs operating two 8-hr. shifts, this plant turns out an average of 20,000 block per day. Production is divided between cinder block and sand and gravel block in varying proportions to meet requirements.

The plant, occupying a 10-acre tract of land, has a storage capacity for 2,500,000 block, about 30 percent of which can be kept under cover. All block are cured in kilns by low pressure steam and then air dried. Three silos provide storage capacity for three carloads of cement.

Use of "roll-off" trucks for block delivery at job sites was demonstrated to the visitors. According to Mr. Freedman these trucks can carry 1000, 8-in. block or 1800, 4-in. units. Of 3-in. block 2000 units can be handled or 3500 in 2-in. block. These capacities are for cinder block only. Unloading at the job can be done in less than ten minutes with or without pallets, Mr. Freedman said. In the plant demonstration a load of 8-in. block was unloaded in six minutes. The special truck body used was designed by Rehberger Co. of New Jersey. It is mounted on an International truck chassis.

Massachusetts Cement Block Co. was started by Mr. Freedman in 1919. The daily production the first year was 150 block. Mr. Freedman says the plant now can produce up to 33,000 block per day but because of restrictions in the residential area in which it is located, the machines cannot be operated at night.

At the opening of the second day's session Tuesday morning, August 7, executive secretary Longenecker, acting as chairman, urged all members to tell their own experiences in solving production or other plant problems. "We are all equally concerned," he said, "about how to make a better product and are interested in whatever methods will make good block to fit all job conditions and requirements."

J. A. Jones of The Yoder Co., Cleveland, Ohio, stimulated a floor discussion of developments in continuous mixing as contrasted with batch mixing. He asserted that continuous mixing produces a better and more economical mix than the batch method. His contention that up to a 40 percent increase in strength could be obtained by continuous mixing was questioned by some of the members who urged that additional research on this phase of production should be carried out.

Mr. Jones also led a discussion on the functions and advantages of a plant laboratory. He pointed out that proper equipment for testing block at the plant does away with long waits for test reports from outside laboratories besides permitting perfect control of quality through tests which can be made each day.

Mr. Copeland was asked to express an opinion as to the effect of a cast-in-place bond beam on masonry walls. Such construction, he said, tends to increase resistance to cracking. By special request, Mr. Copeland used blackboard diagrams to explain the action of control joints in masonry walls.

Sam Paturzo of V. Paturzo Bros. and Son, Inc., Baltimore, Md., described the method of storage and handling of bulk cement in his plant. He said that as much as 250 bbl. of cement an hour could be handled by a combination of a Fuller-Kinyon pump to storage bins and airslides under all bins to convey controlled amounts of cement to mixer scales. Mr. Paturzo estimates that the cost of handling bulk cement by this method is approximately 6c per bbl. (See ROCK PRODUCTS, June, 1951, page 175.)

At the close of the Tuesday morning session, the ladies again were present at the luncheon and also joined with the men in a bus tour of historic spots, arranged by Herbert F. Geist of Geist Coal & Supply Co., Cleveland, Ohio.

A discussion of various aspects of steam curing was led by William J. Shore of Shore Engineering Co., New York, at the closing session Wednesday morning. He declared that although faster and more effective curing is accomplished with high pressure steam, good curing can be attained with low pressure steam or in air if proper care is taken. He said failure to provide an adequate source of steam often prevents obtaining expected results in steam curing. Construction of kilns is important, he said, pointing out that racks, pallets, floors, walls and roof of the kiln must be heated as well as the block.

Mr. Shore also participated in a floor discussion of the causes of cracking. He described in some detail the use of fan-equipped unit heaters to dry block in stockpiles.

Lee Polisner, representing Consolidated Boiler Co., presented pictures and detail drawings on the operation of a new type of steam boiler which he said was designed for low pressure steam curing of concrete block.

Edward E. Meeker, M. & M. Engineering Co., Indianapolis, Ind., ex-

plained the operation of a device known as an Electro-Visor for control of height and density in concrete block. The device is at present used as an accessory on the Besser Vibrapac.

George Oswalt of Oswalt Engineering Service Co., Forest Park, Ill., described a timing device intended to control mixing in block plants.

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Haakon Paulson, Besser Manufacturing Co., Alpena, Mich., described a new school project in Alpena in which he said 3000-lb. sand and gravel block with extra heavy face shells were being used.

The last speaker at the closing session was Herbert Vincent, sales manager, Cinder Block, Inc., Detroit, Mich. He told the producers that quality must be emphasized continually and expressed the opinion that the best way to minimize wall cracking is by use of properly placed contraction joints.

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No election of officers was held, the present officers having been asked to remain in office. They are president, Frank J. Kelly, Geneva Brick Products Co., Inc., Geneva, N. Y., and executive secretary, Harry H. Longenecker, Building Units, Inc., Primos, Penn. A director in addition to Mr. Kelly and Mr. Longenecker is Herbert A. Davis, Washington Concrete Products Co., Arlington, Va.

Registration

Registrations for the convention included the following:

Joseph R. Belot, Belot Concrete Block Co., Tiltonville, Ohio.
E. N. Boggs, Boggs Cinder & Concrete Co., Danville, Va.
William G. Bower, Cinder Shippers, Chester, Penn.
R. R. Bowman, Jr., Harrisburg Building Units, Harrisburg, Penn.
Edmund H. Brooks, National Brick & Supply Co., Terra Cotta, Md.
Duane D. Bryan, Besser Mfg. Co., Alpena, Mich.
Walter M. Burse, New England Concrete Masonry Association, Boston, Mass.
Geno Cambosse, Cambosse Bros. Inc., Auburn, N. Y.
R. D. Campbell, General Concrete Units, Pittsburgh, Penn.
Chester H. Carmichael, I. L. Stiles & Son Brick Co., North Haven, Conn.
Joseph Celoa, Jr., Rhode Island Cinder Block Co., Providence, R. I.
Ralph C. Condo, James Condo & Son, Somerville, N. J.
R. E. Copeland, National Concrete Masonry Association, Chicago, Ill.
Anthony Corrado, Anthony Corrado, Inc., Providence, R. I.
Lawrence Dagostino, Dagostino Building Blocks Co., Schenectady, N. Y.
Dante Denati, Duracrete Block Co., Manchester, N. H.
Joseph DiMondi, Delaware Block Co., New Castle, Del.
Ralph Ducharme, R. Ducharme, Inc., Chicopee Falls, Mass.
Avellino Duchini, A. Duchini, Erie, Penn.
Jack Ells, Stearns Mfg. Co., Adrian, Mich.
David Farnsworth, Cind-R-Lite, Inc., Las Vegas, Nev.
Jack Franklin, Besser Mfg. Co., New York, N. Y.
Jack Freedman, Massachusetts Cement Block Co., Medford, Mass.
Herbert F. Geist, Geist Coal & Supply Co., Cleveland, Ohio
Walter S. Giddings, Lith-I-Bar Co., Holland, Mich.
Thomas A. Gilligan, Stonecrete Corp., Camden, N. J.
Myron Hultmark, Stearns Mfg. Co., Adrian, Mich.
Andre W. Hutnick, Sr., Home Park Building & Supply, Cementon, Penn.
J. A. Jones, The Yoder Co., Cleveland, Ohio
Frank J. Kelly, Geneva Brick Products Co., Geneva, N. Y.
John P. Kuiken, Mooney Bros. Supply Co., New Castle, Penn.
M. F. Ledford, Stearns Mfg. Co., Adrian, Mich.
R. Loran Langsdale, Langsdale Advertising, Baltimore, Md.
H. H. Longenecker, Building Units, Inc., Primos, Penn.
Joseph F. Mazzer, Cambridge Building Supply Co., Cambridge, Mass.
Morris H. Meadows, Stonecrete Corp., Camden, N. J.
Edward E. Meeker, M & M Engineering Co., New York, N. Y.
Allan C. Miller, Cinder Block & Materials Co., Indianapolis, Ind.
Jerome Modell, A. C. Horn Co., Inc., Long Island, N. Y.
S. A. Mooney, Mooney Bros. Supply Co., New Castle, Penn.
A. F. Moore, Pennsylvania-Dixie Cement Corp., New York, N. Y.
Joseph Nagy, Columbia Concrete Products Co., Toledo, Ohio
George L. Oswalt, Oswalt Engineering Service Co., Forest Park, Ill.
Sam Oswalt, Oswalt Engineering Service Co., Forest Park, Ill.
Philip Paolella, Plasticrete, Hamden, Conn.
S. Paturzo, V. Paturzo Bros. and Son, Baltimore, Md.
W. H. Parthmer, Standard Concrete, York, Penn.
Haakon Paulson, Besser Mfg. Co., Alpena, Mich.
Hubert C. Persons, ROCK PRODUCTS, Chicago, Ill.
Frank P. Pezza, Park Avenue Cement Block Co., Cranston, R. I.
John A. Philippi, Waterbury Ready Mixed Concrete Co., Waterbury, Conn.
Max Price, Connecticut Masonry Units Co., Allsten, Mass.
T. J. Rappoli, G. Rappoli, Inc., Medford, Mass.
Robert D. Scott, Besser Mfg. Co., New York, N. Y.
William J. Shore, Shore Engineering Co., New York, N. Y.
Paul B. Sloat, Philadelphia Brick & Supply Co., Philadelphia, Penn.
Royal Sterling, Cinder Products Corp., Providence, R. I.
W. C. Weyland, Bergen Machine & Tool Co., Inc., Nutley, N. J.

SMALL READY MIX OPERATION

WENATCHEE, WASH., in the central part of the state, is nationally known for its apples and in the Northwest is referred to as the "Apple Capital of the World."

Not many miles east of Wenatchee the Bureau of Reclamation is progressing with a large irrigation project that will eventually irrigate over a million acres of land. The water will be pumped from Roosevelt Lake, behind Grand Coulee dam, and will involve the use of 12 pumps, each driven by a 65,000-hp. motor.

As this irrigation project reaches completion the demand for all types of rock products will accelerate. Wenatchee, now a well established trading center, will undoubtedly experience added growth which will reflect from the main project centered in the Ephrata, Soap Lake and Moses Lake areas.

Westerners seem to have a flair for getting maximum results with a minimum of equipment, and this entire Central Western area can supply many examples of this fact. As a result of the growth of the Wenatchee Valley, Kane Bros. last fall entered the ready-mixed concrete industry. At the time of inspection two Challenge truck mixers, mounted on Ford chasses, were in service. The mixers are model 164, size 4500.

The plant is very simple and consists of a Johnson batcher mounted over a five-compartment Johnson bin. An inclined ramp made of native lumber and round timber parts makes it possible for aggregate trucks to deliver direct to the batching bins. Aggregates are purchased. The new operation is owned by A. E. Kane and Leslie Kane.

NEW MACHINERY

Concrete Mixer

CHAIN BELT CO., Milwaukee, Wis., has announced its Rex 6-S concrete mixer, built for fast production on

Mixer with 6-cu. ft. capacity

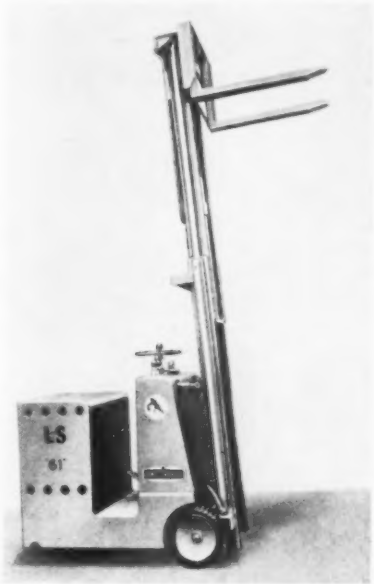
jobs needing a 6-cu. ft. mixer. The water tank has been relocated to the top of the mixer and is said to permit faster water entry, faster batching and more concrete per hour.

Cement Distributor

WOOD MANUFACTURING CO., North Hollywood, Calif., has introduced its two-wheeled rubber-tired cement distributor for use with either bulk cement trucks or bagged cement. The distributor is attached directly behind the truck, cement is dumped into the hopper and by means of a calibrated rotary vane is metered into the windrow. It is reported that the windrow is automatically troughed by an axle-high V-spreader on the front of the distributor, which protects the cement from blowing. The machine has an adjustable capacity of 15-80 lb. per lin. ft.

Electric Fork Truck

LEWIS-SHEPARD PRODUCTS INC., Watertown, Mass., has announced an addition to its line of Standrive electric fork trucks, the SpaceMaster "61." This truck is a heavy-duty high-speed unit especially designed for warehouse operations where minimum operating space is a prime requirement. The company reports that the machine can carry and stack loads up to 3000 lb., 48 in. long and is capable of transporting loads up to 4000 lb., 32 in. long. The full free lift mast design provides 127 in. of fork elevation and 65¼-in. free lift with 83-in. collapsed height. There are no grease



Heavy-duty high-speed fork truck

points on the Model 61, for the new design has eliminated the need for periodic lubrication, according to the manufacturer.

Distribution unit for bulk or sack cement

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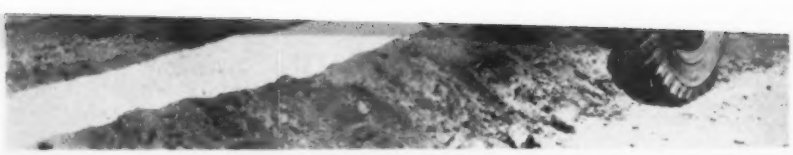


Distribution unit for bulk or sack cement

Fork Trucks

MOBILIFT CORP., Portland, Ore., has in production two new Lev-R-Matic controlled fork lift trucks, both of 2000 lb. capacity. The models both

Lift truck of 2000-lb. capacity

feature a 3-cyl. heavy-duty air-cooled engine, with a 3-in. bore and a 3½-in. stroke, and are governed at 2500 r.p.m.

Model E is constructed for operation in restricted places where the operator must get on and off frequently in the course of his work. The other truck, Model ER, is the sit-down type designed for work where the driver stays on the vehicle most of the time.

Masonry Cutting Blade

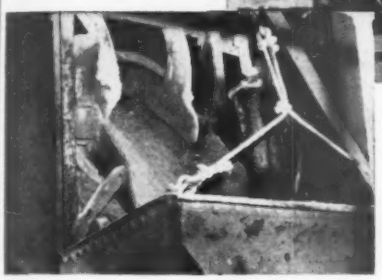
CLIPPER MANUFACTURING CO., Kansas City, Mo., has announced its Clipper "B-R" (Break-Resistant) abrasive blade, which the company says is manufactured in layers of glass fiber cloth impregnated with resins and silicon carbide. This material is then pressed together under hydraulic pressure and processed in controlled temperature kilns. The blade is most effective in the softer range of materials such as limestone, sandstone and lightweight aggregate concrete products.

Steam Generator

VAPOR HEATING CORP., Chicago, Ill., has announced that its steam generator, Model 4740, now a standard installation in diesel locomotives, is now ready for industrial use to supply processing steam. The company states that this generator develops 200 p.s.i. steam pressure in two minutes from 50 deg. F. cold water and produces 4800 lb. of 99 percent dry steam per hr., 82 percent efficiency. Using No. 2 fuel oil, the forced draft air and pressure atomized fire release 1,000,000 B.t.u./-cu. ft. of combustion space. Overall size of the unit is 52 in. wide, 76 in. long and 78 in. high.

17 Years Young and 3,100,000 Cubic Yards to show for it!

126-S Worthington-Ransome Big Mixer at Arundel-Brooks Concrete Corporation's Wolf Street plant, Baltimore, shows hardly any sign of wear after having poured 3,100,000 cu yd in its 17 years.



Worthington-Ransome 126-S discharging full 5 cu yd batch in approximately 30 seconds.

One of Arundel-Brooks' 6½ cu yd agitators pouring a retaining wall at General Sam Smith Park, being built to relieve traffic congestion at Light and Pratt Streets, Baltimore.

In 1950—its 17th year—this veteran concrete mixer poured more than 250,000 cu yds on a single set of liners!

This extraordinary performance of a 126-S Worthington-Ransome Blue Brute concrete mixer is attested to by Arundel-Brooks' records. The machine, given proper maintenance over its lifetime, shows virtually no wear after uncounted hours of profitable service.

Arundel-Brooks operates two other Worthington-Ransome Big Mixers—an 84-S at the Sparrow's Point plant, a 56-S at Brooklyn, Md.

And eight of the company's growing fleet of truck-mounted agitators are Worthington-Ransome Blue Brute Hi-Ups, considered "highly satisfactory in every respect."

These eight are used for most long-distance hauls because their light weight* permits carrying a maximum payload with strict adherence to highway load limits.

FIND OUT WHY THERE'S MORE WORTH IN WORTHINGTON

See your nearby Worthington-Ransome distributor. Worthington Pump and Machinery Corporation, Construction Equipment Sales Division, Dunellen, N. J.

7,290 lb for the standard 4¼ cu yd truck mixer, as little as 6,700 lb for 6½ cu yd agitator models.

WORTHINGTON

BUY BLUE BRUTES

You'll find you, too, can get the real *performance plus* from Worthington and Worthington-Ransome Blue Brutes—a broad line of construction equipment noted for the rugged quality your type of work demands.

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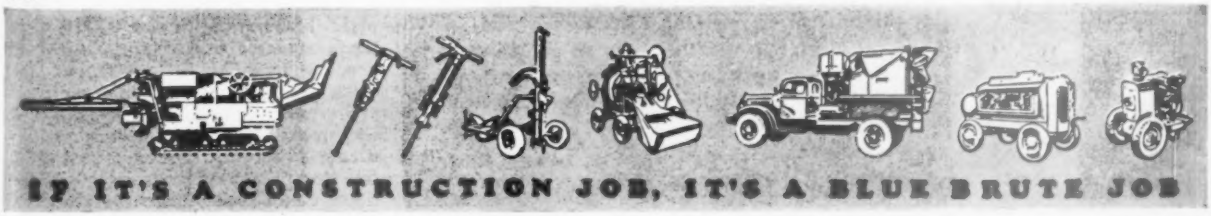

Precast Concrete Plants

(Continued from page 127)

walls, the planks, which are nailable, are stood on end, held in place with 1¼- x 1¼-in. steel angle iron, and nailed together. Roof sections are nailed to the side-walls, and may be pitched or flat. Exterior walls are finished with stucco, and partitions and interior walls with vermiculite plaster applied directly to the plank.

They are being used for floor slabs under radiant heat pipe, ducts, or electric cables to retard heat loss to the ground and eliminate summer condensation that would damage rugs and other floor coverings.

Ackerman is the only Eastern fabricator of precast vermiculite concrete plank. Other specialties for this concrete are liners for insulating coffee roasters, tobacco curing units, and oil burners. Mr. Ackerman also casts blocks of vermiculite concrete for artists to carve into sculpture.

Interior of roof installation using vermiculite concrete plank

The plant turns out thousands of feet of precast concrete septic tanks and covers with self-locking parts; reinforced lintels up to 12 ft. in length; concrete coping, posts, foundation splash blocks, and driveway curbing; also concrete steps complete with platforms. Store fronts and all types of casting from blueprint specifications are done to order. The forms required for this special work are made in the plant. The plant itself has 60,000 sq. ft. of floor area, and the entire operation occupies 16 acres.

Concrete Block Plant

TIM MILLER, owner of Miller Concrete Products Co., Jackson, Ohio, has announced that production at his new plant has now been started. A new block machine has been installed to produce "modular" concrete block. The block are made of washed river sand and gravel and portland cement. Other equipment includes a modern steam-curing kiln. Mr. Miller stated that the new plant permits about three times the capacity of his old plant.

LET CHALLENGE POUR
THE WAY TO YOUR *FULL* SHARE
OF PROFITS!

CHALLENGE design gives you more
cubic feet of drum space

result: more payload
...more net profit!
...and at less investment

In these days of mounting costs, profit margins have a way of slipping downward. You can guard your margin of profit and boost it up substantially ... by standardizing on Challenge Truck Mixers.

In the Challenge Truck Mixer, engineers have solved the problem of increasing drum volume ... adding more net payload, while complying fully with all state weight limit laws. Maximum use is made of the carrying capacity of the truck chassis. You pay less. You get more payload. Your margin of profit goes UP!

Whether you need one mixer or a fleet, you owe it to yourself to investigate Challenge.

GET ALL THE FACTS *TODAY*

Write for complete information and specifications on the complete line of Challenge Truck Mixers ... available in 3 yard, 4 yard, 5 yard, 6 yard, and 6½ yard sizes.

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COOK BROS.
EQUIPMENT COMPANY
Exclusive National Distributors For
CHALLENGE, the modern, streamlined truck mixer
1815 No. Broadway, CApitol 2-9111
Los Angeles 31

FORUM

ON CURING CONCRETE PRODUCTS

conducted by WILLIAM J. SHORE

Question

We are using a 15-hp. vertical firetube steam boiler oil-fired for steam curing a daily production of 2500 cinder block. We bought this type boiler because it was low in cost and did not take up much floor space.

We apparently require more steam for our curing operation and run into difficulties when we attempt to feed more oil into the oil burner firing the boiler. At the present time we can burn no more than 5 gal. of oil per hr. If we increase this, we get so much smoke that we are in trouble with the local municipal authorities and have been fined twice.

Can you offer any suggestions as to how we can overcome these apparently insurmountable difficulties?

Answer

Many block makers when they first install steam for block curing usually purchase these vertical firetube boilers because they do not take up much floor space and because they are low in cost.

The upright vertical firetube boiler is a one-pass boiler. Heated products of combustion travel through so fast that there is insufficient time elapsing to permit complete transfer of heat from the combustion products to the boiler tubes and the water within the boiler shell. As a consequence, the efficiency of this type of steam generator is very poor. It is doubtful whether an efficiency of 60 percent can be maintained over daily operation.

These boilers have small and confined combustion space which, though sufficient for solid fuel firing, is entirely inadequate for oil firing. This is the reason for the great quantities of unburned carbon when attempts are made to increase the steam output of this equipment.

It is possible to increase steam output, even with an additional loss of efficiency, by rebuilding the combustion chamber. This is done as follows.

The boiler is removed from the setting, or else jacked up to a height of 16 in. above its present setting. A new combustion chamber must be built where the internal diameter is slightly less than the internal diameter of the firing pit and of a height 16 in. greater than previous. At one side a new tunnel is built and the oil burner is relocated so that it fires into this tunnel, the flame entering the combustion chamber tangentially. This gives the flame a circular path of increased length, sufficient to burn increased quantities of fuel oil.

With the additional volume of the new combustion chamber and the tangential flame firing, it should be possible to increase fuel delivery by close

to 50 percent or roughly a steam delivery equivalent to 22 hp. using 7.5 gal. of oil per hour. Of course, efficiency of operation will be somewhat less than before.

We still believe that even with the increased steam delivery achieved, this is insufficient capacity to steam cure properly a 310, 8 in. block per hr. production.

Record Concrete Contract

KOLINSKI CONCRETE CO., Milwaukee, Wis., has been awarded a $15,000,000 contract for pouring concrete at the Savannah River, S. C., hydrogen bomb plant. Company officials stated that work has already been started on the 3-year job of pouring 1,250,000 cu. yd. of concrete. The Defense Production Administration has approved a $1,438,500 government loan to the company for purchasing additional equipment for the contract. Six concrete batching plants will be moved to the site and 40 new ready-mixed concrete trucks have been purchased for the job.

New Concrete Flooring

THE RESEARCH FOUNDATION, University of Cincinnati (Ohio), recently announced the development of a concrete floor surfacing that can be sanded, stained, waxed and polished, and which is said to be almost as resilient as wood. Dr. Fred O'Flaherty, executive director of the foundation, stated that the new material was developed by Robert T. Howe, instructor in civil engineering at the university, under a continuing research contract with Sakrete, Inc., Cincinnati, Ohio.

"No-Fines" Concrete

AIR BUBBLES ARE substituted for sand in a lightweight concrete developed by R. C. Valore, Jr. and W. C. Green, National Bureau of Standards, and described in the *Journal of the American Concrete Institute*, June, 1951. This "no-fines" concrete grew out of a request from the U. S. Bureau of Plant Industry, Soils and Agricultural Engineering for a material adaptable to farm buildings. The many tiny air bubbles enclosed within the material not only replace the sand used in ordinary dense concrete, but also reduce weight, serve as insulation, and offer resistance to water penetration.

Results of an investigation at N.B.S. indicate that the replacement of conventional fine aggregate by entrained air produces workable mixtures having relatively low water-cement ratios. The mixtures studied consisted of a high early strength portland cement, siliceous pea gravel (No. 4 to ⅜-in. sieve fraction), water and an air-entraining agent. Two different air-entraining agents were used: a proprietary neutralized resin and a proprietary sodium lauryl sulfate-type detergent.

Air contents as high as 45 percent were found possible in concretes con-

taining no sand, while there appeared to be a "ceiling" of about 30 percent in the air content of mixtures containing both sand and gravel. However, the amount of entrained air was limited critically by the minimum compressive strength requirement of 500 p.s.i. The lowest cement content permitting attainment of the required strength in an "air-gravel" concrete was about 3¼ bags of cement per cu. yd. of concrete. In this lean mix it was necessary to maintain an air content of about 25 percent to provide necessary workability and strength. A second mix containing about 5.6 bags of cement per cu. yd. of concrete provided the required strength for air contents as high as 29 percent.

The compressive strength was sensitive to variations in air content; an increase of 1 percent in air content was generally accompanied by a decrease of about 100 p.s.i. in compressive strength for both mixes. The indicated density of air-gravel concretes having a 28-day compressive strength of 500 p.s.i. was about 113 lb. per cu. ft. for the lean mix, and 105 and 109 lb. per cu. ft. respectively for concretes containing 5.6 bags of cement per cu. yd., as compared with 140 to 145 lb. per cu. ft. for conventional, nonaerated, sand-gravel concrete. While compressive strengths were only ¼ to 1/5 those obtained for nonaerated concrete, the moisture properties and thermal conductivity of air-gravel concretes compared favorably with values obtained for denser concretes.

Mean water absorption of the lightweight concretes upon soaking for 24 hr. at room temperature was about 9 percent, by volume, for all mixes, compared with 11 to 15 percent for conventional concretes of similar aggregate and cement contents. Saturation coefficients ranged from 0.22 to 0.36, or about ½ the values previously reported for nonaerated sand-gravel concretes. Drying shrinkage of the air-gravel concretes did not differ significantly from values obtained for ordinary sand-gravel concretes, ranging from 0.04 to 0.07 percent for 2-x 12-in. prisms after drying 180 days.

Thermal conductivity of air-gravel concretes ranged from about 5 to 6 B.t.u./hr./sq. ft./in./deg. F. Thermal conductivity of a nonaerated sand-gravel concrete was 9; a value often cited for conventional concretes is 12, but values ranging from 7 to 16 have been reported.

The air-gravel concretes are still considered experimental. The advantages in reduced density and thermal conductivity are appreciable but are gained only at a great sacrifice in strength. Greater advantages might be gained with higher cement contents and higher air contents, but the relatively high density of conventional aggregates imposes certain limits. The use of lightweight aggregates blended with dense aggregates in relatively high air-content concretes may be a means of obtaining worthwhile reductions in density and thermal conductivity while maintaining low-order drying shrinkages.

Building Industry Fights Controls

AT THE SIXTH MID-YEAR MEETING of the Building Industry Employers of New York State, held at Lake Placid, June 22-23, 1951, and attended by more than 200 contractors from 22 cities, a resolution was unanimously adopted calling for the formation of a national association of local builders' exchanges and state associations of builders to "protect the building construction industry from adverse governmental regulations."

Spearheaded by members of the Building Trades Employers' Association of New York City, the convention specifically cited existing controls imposed by Order M-4 of the N.P.A., which, they said, are strangling the industry in non-defense areas.

The action taken by the Building Industry Employers was in response to a forceful plea by Joseph D. Keenan, secretary-treasurer of the Building Trades Department of the American Federation of Labor, who called on the building construction industry to form a "united front" to present its case to the public and governmental agencies.